

## **INTRODUCTION**

The following paper contains the descriptions and experiences learned during my internship at Universal Music and Video Distribution. During my internship, I had the privilege of learning many skills needed to become a valuable team member to future employers. In the following, I will describe in detail the skills I have learned in manufacturing, management, and technical applications as well as the different roles I filled as a Master Technician that I feel has been an asset to my intern experience.

## **MANUFACTURING**

I thought I had a good idea of what manufacturing was about, but it did not take long before I found out that I knew only a very small part of a big picture. I was not aware of the constant research and ongoing process changes that occur to keep a facility working properly and trying to maintain a stronghold on the competition.

In a manufacturing environment, I learned that teamwork is not just a requirement, it is a necessity. Each and every process must be performed at a high level of integrity. If at any time during the manufacturing process, the procedures are deviated from, the remaining processes may be jeopardized. For this reason, each department has a variety of tests and inspections that the product must pass before moving to the next stage.

## **MANAGEMENT**

As a technician, I was put in charge of one of our four shifts in Mastering. My duties were not only to perform maintenance on the machinery, but also was responsible for managing and overseeing all processes within my department as well as to supervise my operators.

As in most management positions, I had to attend weekly meetings to address such topics as production levels, maintenance procedures, personnel training and exchange new ideas for cost-effective alternatives to present procedures. I found these meetings to be very productive and informative. Here are some examples of changes I was directly involved in.

Production levels were considered to be sufficient in our department until we used statistics to analyze our efficiency. It was found that our department was operating at lower efficiency than was desired. After observing the department more closely, we found that much of the operators time was spent doing paperwork and traveling from machine to machine to perform their operations. The time spent doing these tasks kept the operators away from their machines, thus leaving them to set idle.

To remedy these problems, we had to find a way to get the same amount of work accomplished, but in less time. To do this, we first incorporated bar coding and scanners to replace the manual typing. Secondly, we restructured the department by moving machinery closer and aligning it in a more orderly fashion.

Another problem cutting production was training new personnel. To increase training time, another technician and I compiled a Standard Operating Procedures manual that new operators could use instead of pulling more experienced operators away from their duties to assist them.

As with every company, cutting operating costs is a big issue. The company uses bottled nitrogen to provide pressure to the chemicals used in our Automatic Mastering System. This system uses one bottle a day, 365 bottles per year at a cost of \$40 per bottle. The department had purchased a nitrogen generator three years ago and did not get it to work properly. The problem was that it could not keep up with the demands. I was asked to research it and find a way to use it. I found that the reason it could not keep up was not due to the generator, it was the holding tank being used was too small. I purchased a larger tank at a cost of \$600 and installed it so that it still uses a bottle backup in case of an emergency. This will save our department

approximately \$14,600 annually.

## **TECHNICAL**

In the Mastering department a wide range of technologies is being used. Although many of the applications I worked with are specialized to the music industry, the same equipment with minor modifications can be used in other applications as well.

In my duties as a technician, I performed maintenance on a variety of different systems such as Christ and U. S. Filter water deionization systems, Toolex electroplating equipment, RPA pneumatic punches, Koch diagnostic equipment and the ODME automatic mastering system. The most complicated being the Automatic Mastering System. This machine is an excellent machine to gain knowledge on due to the great variety of devices and scientific applications this system uses.

The Automatic Mastering System uses a Coherent laser to etch music onto a glass substrate and then produces a nickel shell through an electroplating bath. This process involves many steps and uses a PLC to control most of the processes. When an error occurs, it can stem from the laser currents being out of tolerance, limit switches, power interrupts, faulty actuators, chemical application problems or combination of all. Troubleshooting these problems can require an extensive amount of research using technical publications before even touching the machinery due to the multiple processes each step uses. I found that fixing the problem is usually easier than finding it.

In addition to using my electronic and mechanical skills, I had to perform many chemical analyses on the electroforming baths. I was required to do routine bath checks such as pH balance, surface tension, specific gravity, boric acid and nickel titrations to ensure that these baths contained the proper concentrations of chemicals needed to operate at optimum levels as well as mixing chemicals to adjust for any deviations.

## **CONCLUSION**

My internship with Universal Music has been a valuable learning experience. It has given me the chance to apply my technical and management skills in a working environment and to learn from more experienced personnel new and better ways of achieving goals. I have also learned a higher level of responsibility, not only for my own actions, but for actions of others also. Above all, the most important assets I feel I have taken from this experience are a higher degree of professionalism and the willingness and the ability to learn.

## **WEEKLY JOURNALS**

October 19-22, 1998. 48 Hours

My first week was spent assisting the technicians and operators to become familiar with the equipment in the department. There are many different procedures that must be learned before being able to work on this type of machinery, so I had to start by observing the operators and following them through their routines. I learned to operate the PLC controlled Automatic Mastering System first. There are many pages to each function and two levels of access, which make this system complicated to learn.

I began performing maintenance under supervision toward the end of the week. I found that most of the repairs were much easier to fix than to find. This system is mostly automatic and uses many sensors to guide it through the process.

October 27-30, 1998. 48 Hours

I assisted the Master Technician in daily duties as well as any system problems that occurred during the shift. Daily duties included chemical analysis of the electroforming baths, diagnosis of production scrap, and

other similar inventories. I received an alarm on the AMS indicating that the electroforming shaft was not rotating. I troubleshot the system and found a circuit breaker had tripped due to a wire being cut by an actuator. I also found that our stampers were stressed and had to add sulfamic acid to the electroforming bath to lower the pH.

I received an alarm on the AMS after the operators had made chemicals indicating that the nickel heater had overheated. I found that a solder joint had broken on the connector to the thermocouple. I soldered the wires back into the connector and this cured the problem.

November 4-7, 1998. 48 Hours

I had to do research on our water deionization system. This system has been giving us problems lately and general maintenance has not fixed it. I had to call a representative from the manufacturer to discuss the problems we were having and obtain a list of probable causes for the malfunction. The most likely cause was a multilevel metering valve. I had to disassemble the valve and clean the deposits in levels two and three. The problem was the deposits were restricting a flow control venturi.

The disc handling system, which is automatic and moves the glass substrate from station to station was breaking the glass. I had to put the system into manual mode and teach the system. By doing this it adjusts the parameter to the correct positions and stores them into memory.

November 12-15, 1998. 48 Hours

I was assigned a project to cut yearly costs for the department. This project consisted of replacing our bottled nitrogen that provides pressure to the chemicals used in the Automatic Mastering System. The company had purchased a nitrogen generator a few years ago and had never got it to work properly. I found that the generator could produce enough nitrogen for our needs, but it needed a larger holding tank. I designed the system to use a bottle backup in case of generator failure. This saved the company approximately \$14,600 per year.

In one of the electroplating cells the shaft was not rotating. I disassembled the motor and gear assembly. I found that the shear pin on the worn gear assembly was broken. I replaced the pin and the shaft worked properly.

November 20-23, 1998. 48 Hours

The laser failed on the AMS halting all production in the department. After inspection, it was found that the laser tube had expired. We installed the new laser and aligned the optical paths, but the laser still would not operate correctly. It took three days of troubleshooting to find that a PROM in the translation board was faulty.

Also, our U. S. Filter water purification had stopped working. Upon investigation of the system, I found that the pump on the reverse osmosis side was off. I reset the system due to inlet pressure being low. This did not work, so I shut the system down and restarted it. This started the reverse osmosis side, but still did not have any pressure coming out of the tank. I switched the tank from auto to manual and this should have started the tank, but it didn't. After inspecting the control panel and taking voltage readings, I found a faulty contactor and replaced it. This fixed the problem.

This concludes my internship. Although I performed many other various tasks during my time at Universal, I feel this was some of the more difficult, not only due to my unfamiliarity with the different systems, but by using my available resources to investigate the problems and solve them.

