2014 CAWS Educator Exchange Narrative

I was again honored to be chosen for the CAWS Educator Exchange Program this summer. I was assigned to Topre America Corporation (TAC) this year. Topre makes a variety of parts for several companies in the automotive industry. Topre has expanded multiple times since it opened over ten years ago, so the corporation has now nearly quadrupled in size.

I found it interesting that forms at Topre are to be filled out in black ink, using military time and the metric system. In teaching, even English teachers have gotten away from requiring students to use blue or black ink because so many papers are typed now. It was nice to see that black ink is still used—that there really *was* a reason we were doing that!

There was a lot more reading that you would think involved in the factory setting. From time to time, engineers and others pulled out spec sheets and configuration drawings, but there was also reading and writing involved in quality alerts, critical alerts, various reports, sorting sheets, jig sensor check sheets, quality check sheets, coil logs, die setting check sheets, weekly improvement sheets, and more. In addition to being able to read these reports, workers must also be able to decipher another worker's handwriting on some of the reports. It was nice to see that teaching students that legibility matters is not obsolete (yet)!

Because they may buy 60,000 bolts in a year, prices are carried out to fractions of a cent. In other words, you carry the decimal out five places when quoting a price for materials because by the time you purchase 60,000 bolts (not to mention all the other parts required for the many projects), the fractions of a cent add up to a substantial difference. Each products has its own coil of metal, which sounds wasteful, but is actually not because if a coil were just 2 mm too wide, there would be substantially more waste due to the vast number of parts being run each day. For example, 17-18 truckloads leave Topre each day. Despite how careful Topre is not to waste materials, however, their dollar amount for their scrap comes close to $20,000,000 a year.

Topre is already working on projects for 2017. They make parts for Nissan, Toyota and Honda. They do about 60-65% of their project work for Nissan.

There are two Topre plants in China, one in Thailand, one in Korea (I believe that's what they said), one in Mexico, and the "father" plant in Japan. There are also two "sister" facilities in the United States. If I remember correctly, they are in Smyrna and Canton.

The training program at Topre consists of one and a half days in the "classroom" before employees are even permitted on the floor. Employees begin on Mondays or Wednesdays to allow for this training time. Much of this training covers safety due to the number of ways an employee could be injured. Employees attend monthly meetings with the president, HR, etc. They receive two pretty hefty bonuses per year, but they also have two weeks off (one at Christmas and one in July) due to plant shutdown. During this time, most employees will file for unemployment because time off due to shutdown is unpaid. Some employees will work during this time to install new robots and other equipment or to run test parts for a new project. Employees at the management level have a meeting each morning to discuss progress on projects, customer concerns, customer complaints, etc. Small groups may have additional meetings as needed. The morning meeting is informal. The involved employees walk to the front of the central office area (all management and leaders—all the way up to the president—

have desks in one cubicle-less office area) and stand during the meeting. Various employees present their data and add information to the dry erase boards.

The maintenance department also has a morning meeting each day. This meeting contains the entire maintenance department, so it is the first thing for A shift and the last thing for B shift. The maintenance department works twelve-hour days, and they rotate between A and B shift in a four on/three off pattern. In their morning meeting, various employees read from the engineering report and add information as needed to explain what was fixed, how long the line was down, what preventative maintenance will soon be needed, what caused the problem, and so on.

The weld techs also work only two shifts, but they work their rotation out differently. Each day, one person comes in a couple of hours late and works longer, so that there is at least one tech on premises at all times. The weld techs are responsible for reteaching the robots used for welding, as well as any other welding-based problems. I found the day that I worked with the weld techs the most interesting. I had no idea that welding was as strong as it is. I thought it was more like soldering: melt some metal and glue too parts together. That's not at *all* what it is! They showed me what a weld looks like under the microscope. The two metals that are joined actually melt into one another. A weld is much more durable than I imagined! In addition, much of the welding done at Topre uses electricity to melt the metal, not heat. I find the science behind this fascinating!

I'm not sure what it was about it, but the press department was the least interesting to me. Perhaps it was because I felt that this was one of the most dangerous areas of the plant. It was neat to see a coil go into a machine and come out as three-dimensional parts, but the noise and amount of pressure exerted by each die was intimidating. One of the smaller dies still weighed in at 2.5 metric tons (a metric ton is 2204.62 pounds)! The dies are not really all that sharp. They cut because of the pressure and due to the limited space the metal has to go. In fact, when the metal is "cut," only about 10% of the metal is cut, the rest is really more broken. (Broken is very different from torn. Broken is good, but torn is bad and what happens when there's a problem with a die line). Some of the dies work on a transfer method, while others work on a progressive method (progressively adding one more change to the part until it is finally complete).

The coolest stamp process by far was the heat (or hot) stamp process. Topre has one of the largest head stamps in the United States. In this process, the metal is heated at about 1400° Celsius for five minutes. It slowly rolls down very expensive, ceramic rollers while it is heating. Next the metal is stamped (which would not have been possible if it had not been heated first). The metal is "cooled," so that it will retain that shape, but it is still so hot when it comes out of the oven that workers must wear welding mitts to handle it.

The final step before parts leave Topre is the quality inspection. Once again, there are various forms to fill out and read. A small portion of quality is called sorting. Every morning, their supervisor reads safety rules to them again, they read about the part they are sorting, and begin sorting parts. They must fill out a sort sheet and read the label on the box of parts for each box of parts sorted. The part numbers can be very similar in some cases.

There are a couple of really cool things that happen in the quality department. Employees can take a giant portable scan gun and scribble, scribble, scribble until it creates a three-

dimensional image of a part. This three-dimensional image can then be overlaid with the CAD of the original part, so quality can see at which points the new part is still within spec and where it is not. This helps them tell where the problem truly lies. In addition, quality puts a coating on the test blanks (the flat pieces that will be stamped into parts for a new line). This coating is a pattern with interlocking 10 mm circles, and is applied in-house by applying a solution to the blank. Then a template (kind of like mimeograph film?) is placed over the blank, and a wand with current is run over it. The current etches the pattern into the metal. The pattern of interlocking circles can be measured. A formula is used to determine the amount of stretching. Only a certain amount of stretching is permitted; otherwise the part will not be strong enough.

All in all, I feel a lot better about what a car is made of! I've seen the tests used to make sure each part meets stringent requirements. I had begun to worry because so much of a car is now fiberglass, but now I've seen how much pressure even a very thin piece of metal that has been welded or gone through hot-stamping can withstand.

I was amazed at how large Topre is! There are more employees at Topre's Cullman plant than there were in my high school! Although there are so many employees, most of them are doing different jobs—very fast-paced jobs. Several of those employees have a college degree, but most of them do not. Many of them don't have a high-school diploma.

Topre seems like a nice place to work. I like the focus on communication. They seem to like to promote from within, and they don't skimp on safety. Most of the jobs are not easy, and they are high-pressure, but the pay is good, and you can move up if you decide to learn additional skills.