

Safety Concerns in Factory Automation

Professional Practice

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Manufacturing is a one of the largest aspects of engineering and technology in today's society. Manufacturing takes raw material and transforms these materials into a final product. These products range from cardboard boxes to high tech equipment, virtually anything and everything is manufactured. Manufacturing a product usually involves many steps and processes to accomplish making the final product. These steps and processes are completed by humans, but in many cases the factories use robots and humans to accomplish these tasks safely and quickly. Although robotics is increasing finding its way into automation, there are still safety concerns in a factory setting. Some of the major safety concerns in a manufacturing are directly related to human interaction throughout the factory. These issues consist of poor maintenance, hazards, undertrained employees, insufficient first aid, carelessness, and unrestricted access.

First off, poor maintenance can be a big issue for manufacturing as it can lead to down time of the machines, losing the company money for as long as the machine is down. Also poor maintenance can lead to some serious safety issues. Poor maintenance leads the machines down a path of poor quality which can prove dangerous and expensive to fix. Most of the machines in factories are large and have many moving parts, which if not taken care of could lead to injuring someone or even someone's death. These machines typically have fail-safes that help prevent injuries but, if the machines are never inspected, you may not know if the fail-safe is malfunctioning.

To prevent machine malfunctions and limit down time, many companies enforce preventative maintenance. Preventative maintenance is the performance of regular

maintenance on a piece of equipment to help reduce the percentage of the equipment failing. The difference between preventative maintenance and regular maintenance is that it is planned and occurs while the equipment is functional. For example, in a corrugated container plant, after “X” amount of cuts have been made with a certain blade, the blade might swap out, preventing the blade from being damaged and causing other issues in the process. The only disadvantage to preventative maintenance is that it needs to be planned and kept up with, unlike run to failure maintenance, which essentially runs the equipment till it fails. The planning aspect means resources must be allocated to planning the maintenance, which could be taken away from other aspects of the job. The advantages to this type of maintenance is the reduced cost of maintaining the equipment and the safety of the equipment because it should break down less often.

Next, machines breaking down pose a threat to safety, but many of these machines are constant hazards when they’re working perfectly. This is why it is important to know how the equipment works and what parts can be dangerous. This goes hand and hand with knowing how to operate the machinery properly, which will be discussed next. It is important to follow safety protocol while operating the equipment. This may involve wearing eye protection, head protection, hand protection, and so on. This ideas apply to physical and chemical aspects of the equipment. Proper training will limit increase the safety of operating the machinery in a factory setting.

Following the hazardous equipment, which many factories use, is the proper training that goes along with operating the machines and processes. It almost seems obvious that if you are not trained or qualified to operate a machine you should not

being operating it. This concept applies to almost any profession or task. For example, it would not be wise to task a business man to construct a nuclear bomb, as it would endanger the business man and the people round him. The same goes for a factory setting; it is important to hire people who are qualified for the job and then to properly train them with the equipment. In doing this it will improve the safety rating and production quality of the manufacturing process. Undertrained employees should not be able to operate the machinery until they're properly trained and it is important to continually train the employees. Continually training the employees keeps the information fresh and allows them to operate the machinery to the best of their ability. It is also important because technology is rapidly changing, which means that the operators need to be up to date with the new technology being used in the manufacturing process.

Next, first aid is a must in a high paced factory setting. Even if the main focus is to limit injuries and accidents it is still necessary to have the proper first aid in case an injury does occur. Not only should the facility contain these first aid materials, but the employees should be trained in using the materials and other first aid techniques, such as CPR.

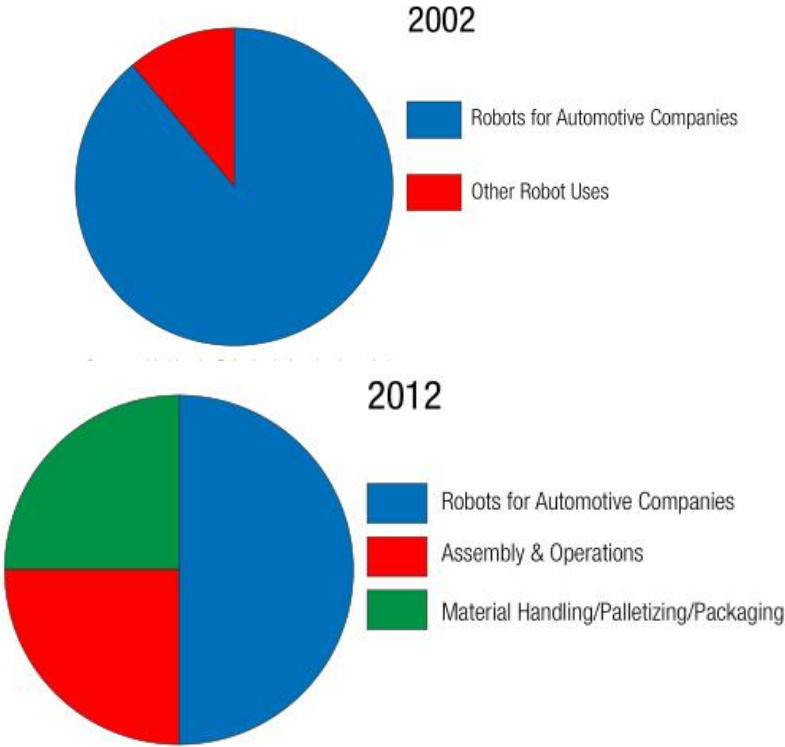
Next, complacency can become a safety issue for any employee in a factory setting. Complacency can apply to any idea that was previously discussed. If an employee gets careless with operation, safety procedures, training, or even first aid, it could lead to further complications of safety for the individual who became complacent and his coworkers.

Finally, restricted access is common for employees and other individuals in the factory setting. Essentially, restricted access can go along with proper training and authorization. If an individual is not authorized to be in a specific area they should not be in the restricted area. Certain areas require certification or even just the proper safety equipment to ensure the individuals protection. For example, the human resources employee of the plant should not be wandering around the plant floor, unless given proper safety equipment and authorization. Many restricted areas in manufacturing are where the robots are held that work on the different processes. These area are especially restricted because of the fast paced motion of the robots performing dangerous task.

As technology develops the processes and procedures to operate the equipment and robots changes as well. That means for the employees working with this equipment in the manufacturing plants need to adjust their operation habits, procedures, and knowledge. For many employees this could lead to employee resistance. Employee resistance is any conduct that serves to maintain the status quo in the face of pressure to alter the status quo. For example, a factory worker has been worker in his position for over 30 years and has mastered his machine/operation. Then one of two things happen, either the machine he has been working on gets replaced with a newer machine that is an improvement over the last one or the man gets replaced by a robot that does his job faster and more accurately. In the first case, it makes sense that the employee would show some resistance to the change in the technology, as he spent his last 30 years of working perfecting his knowledge of the old machine. This then brings challenges to the management of the plant to enforce the change so that the employees adjust properly

to the new equipment. If management does not successfully integrate the employees with the new technology, it could lead to more complex problems and even failure of the plant. Introducing new technology also has a safety concern about proper training and basic fundamentals of machine safety, which were discussed previously. In the second case, the robot will essentially replace the operator, which is the path manufacturing is headed, towards full automation.

Robots replacing humans has been a common ethical topic in the past few years, as the technology is rapidly developing to support this change. Should robots replace



jobs typically done by humans? “The real purpose of automating manufacturing is to eliminate skilled workers and replace them with low paid button pushers—preferably offshore,” commented one *IEEE Spectrum* reader who’s worked as a control engineer for 25 years. The pro robotics side of the issue claims that robotics will take some jobs but in order to for manufacturing companies to be competitive they will need to

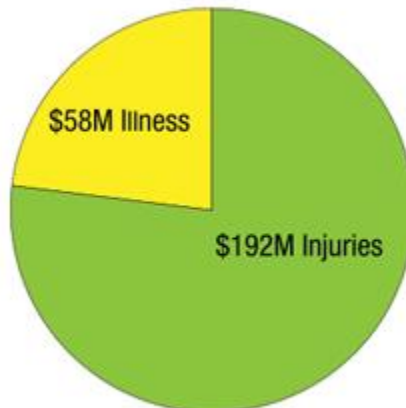
implement robotics to keep production speeds up to par. But by increasing the amount of robots in their operation they will be able to expand the company and in return continually hire more employees. Robotics, rather than eliminating jobs, will just shift the job market. Yes, robotics will destroy some jobs, but the new technology will also open up new opportunities for work, which will fill the gap of the jobs it eliminated. The factory worker of tomorrow will not be needed for the ability to lift heavy packages, but for the ability to find the most efficient way to satisfy the customers' needs and get the job done efficiently.

Robotics can prove beneficial to a company's production line by improving safety, quality, productivity, efficiency, and competitiveness. An industrial robot is defined as an automatically controlled, reprogrammable, multipurpose manipulator programmable in three or more axes. These are the type of robots that will be flooding the manufacturing industry in the years to come. Many tasks that need to be completed in the manufacturing setting can be too dangerous for humans to accomplish, which is where robotics comes in handy. The robots can handle tasks that are too hot, heavy, or hazardous for humans to accomplish. Not only do robots help improve safety they improve the efficiency of the production line but being faster and more accurate. When compared to humans robots on the production line save the company much more money.

By implementing robotics into the production line companies will be benefit tremendously from the robots. Robots are a one-time purchase as opposed to humans who need to constantly be paid for their work. Robots increase production time, they

don't call in sick, and they can't get injured. In these areas robots provide a huge savings for companies as opposed to humans.

Cost of Work Place Injuries and Illness  
Annually in US



Milbank Quarterly, Dec 2011

### Cost of Litigation Destroys Profitability: Robots Don't Litigate

In conclusion, the factory setting can provide many challenges for the employees and upper management of the facility. This includes safety, operational, and financial issues. The safety concerns in automation include a multitude of issues such as, poor maintenance, hazards, undertrained employees, insufficient first aid, carelessness, and unrestricted access. Many of these issues are solved with the implementation of robots. They solve many of the safety issues, as well as provide companies with improved manufacturing quality, production time, and revenue. This is why robotics are making their way in automation and factory settings.



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