

## **Statement of Purpose: Troubleshoot a Process Automation System**

### **Target Audience**

In manufacturing plants, maintenance technicians are the first people operators call if part of the plant's equipment stops working the way it should. Operators may be able to tell that something is wrong, but they typically can't determine what is causing the problem. It is the technician's job to sort through possible causes, find the problem, repair it, and get the equipment working again for the operator.

### **Current Situation**

Manufacturing equipment can stop working for a variety of reasons. If a technician doesn't follow a systematic troubleshooting algorithm, it can take them a lot longer to find the problem than a one who does use a systematic approach (Gilbert, 1996). This causes delays in resuming production, which results in lost revenue for the plant.

A master technician's success in troubleshooting doesn't depend on how much they know about the details of how the equipment works. It depends on their diagnostic skills. A master technician knows exactly what questions to ask and in what order to ask them to quickly pinpoint the problem. One concept that guides the order of their questions is the split-halves technique.

A successful technician knows how to ask questions that essentially split the system or sub-system in half and determine which half is likely to have the problem. By repeating the process on each successive half, they can pinpoint the problem without wasting time making unnecessary tests and checks (Gilbert, 1996).

The typical technician, however, often follows a random, unsystematic process of checking things to find the cause. This takes a lot longer and keeps the equipment down longer than necessary.

The problem is compounded if the technician starts replacing parts in an attempt to fix the problem without being certain the part was actually bad. Sometimes several parts are replaced this way and the problem remains. This results in unnecessary part replacements, which takes even longer and wastes good parts.

### **Impact on Community**

A plant will run more efficiently if its technicians keep the equipment up and in production as much as possible and only replace parts when needed. A more productive plant enhances the economy of the local community. An efficient and productive plant can employ more people than a less productive one. Its increased production also produces more revenue for the plant, which results in more tax dollars back to the community.

### **Value**

Downtime of a large plant or manufacturing facility can be in the thousands to hundreds of thousands of dollars a minute. For example, in 2001 Rockwell Automation performed a training needs analysis for a large distribution center in the Southeastern U.S. The value of the training was significant because downtime cost the center \$200,000 – 250,000 / minute when a problem caused output to stop.

Additionally, if training programs aren't designed in the context of a specific job's key responsibilities and duties, the training will be very inefficient. The return on the training investment will be much lower than one that serves the context of a specific set of employees. In 2009, Rockwell Automation performed an integrated performance assessment for a large commercial bakery. To bridge the skill gaps found during the assessment, the electrical technicians at the bakery would need 54 days of training using standard, off-the-shelf courses. However, by designing a curriculum that fit the specific context of the bakery's technicians, Rockwell Automation was able to reduce their training time to 20 days.

## Goal

The goal of the course is that each exiting technician will be able to produce an automation system that is operating again after a problem, while making no unnecessary diagnostic checks and replacing zero parts that didn't need replacing.

## References

- Gilbert, T. (1996). *Human Competence: Engineering Worthy Performance*. Washington, DC: International Society for Performance Improvement
- Rockwell Automation, Inc. (2001). *Training Needs Analysis*. Mayfield Heights, OH: Training and Performance Services.
- Rockwell Automation, Inc. (2009). *Integrated Performance Questionnaire Report*. Mayfield Heights, OH: Training and Performance Services.