



Reliability Center, Inc.
www.Reliability.com
804-458-0645
info@reliability.com

Here Lies Troubleshooting: In Today's Competitive World, "Analysts" Find Real Solutions

Charles J. Latino, RCI Founder, 1929-2007

In many ways, this article is a requiem for a time-honored function in plants and processing facilities throughout the chemical industry. In today's competitive environment, where survival often depends on increasing efficiency to the maximum and reducing costs the minimum, it may be time to lay the traditional concept of "troubleshooting" to its final rest. In its place, we need to create and nurture new breed of problem-solver; the analyst.

What is the difference between the old-fashioned "troubleshooter" and the modern analyst? In simplest terms, it comes down to the first question asked when an undesirable event occurs. The troubleshooters ask, "How can we fix it?". The analysts ask, "Why did the failure occur in the first place?"

Perhaps I can best illustrate the point by sharing a little story. It exemplifies situations that occur daily in manufacturing plants across the country.

All the shift mechanics carry some chain and chain links in their tool boxes. They know that it is likely that the chain driving the feeder under Area 13 dryer is going to fail. It always does, at least a couple times per shift. If the mechanics carry extra chain and chain links, the job is really quite small - maybe 15 minutes to a half hour. Usually the chain breaks. Sometimes it merely comes off the sprockets. The job entails removing the guard and replacing or resetting the chain.

The job described above was not recorded in the maintenance management system software because it was too small. It was assigned to a routine work order number established to accumulate all the small jobs. Only the mechanics' time and, occasionally, some chain and links were recorded in the maintenance management software. The nature of the job was not recorded in the maintenance management software although it was usually recorded in the shift notes. The shift notes were used as a review by the next shift to find out what jobs were left open and needed to be finished and to get a sense of the mechanical condition of the plant.

One has to wonder why this job persisted over the years. We can assume correctly that if the cause was obvious then the mechanics would have corrected the problem. But in this case, the cause was not obvious. However, a little bit of logic applied to the problem would have lead to the solution, but it was not applied. Why not? There are several possible reasons:

- The mechanics were busy and could not spend the time.
- The mechanics were not trained to use a logic method to deduce causes.
- The mechanics' paradigm was to find solutions, not causes.
- Solving small problems that no one knows about does not get recognition and may actually hurt job security.

But isn't there a troubleshooting motive in all of us? By definition, a troubleshooter is a person who locates and corrects problems that interfere with the flow of work. The mechanics in our little story rightly can be called troubleshooters. They located the source of the stoppage and they corrected it, time after time.

Troubleshooters are people who take a "shot" at an answer to a difficult problem. We can easily see that the troubleshooter is someone who tries, attempts, or guesses at the answer. We clearly do not want a troubleshooter to solve our problems. Indeed, it is time to lay the term troubleshooter to rest.

What we need in today's environment is something much more precise and fulfilling. The proper term is analyst. The **analyst** breaks open the whole and examines the parts. An analyst also considers the parts in terms of the whole.

The problem of the chain breaks was eventually solved when someone reviewed six months of shift notes for repeaters. That person found that the chain problem occurred on the average of two times a shift. Further examination found that if the mechanic took the time to realign the sprockets the frequency dropped off to zero or once a shift. In lieu of alignment, the problem persisted at frequencies of 3 and 4 times a shift. Further inquiries into the purchase of chain and chain links revealed a modest amount of money being spent for parts. In total, the problem of sprocket chains was costing \$25,000 per year.

The analyst next developed a simple logic tree to determine causes. He drove the tree down to engineering deficiency. He then went back to the original design to verify his hypothesis. He found that the design engineer had misplaced a decimal resulting in the feeder turning 10 times faster than intended. Having analyzed the problem down to its mechanical cause the solution was simple: change the sprocket sizes, align them and install new chain. The problem disappeared. This was not **troubleshooting**; it was **analysis** that solved the problem.

Several thoughts can emerge out of this story. For example, it is unlikely that analysts will emerge in a troubleshooting environment. The pressures that create and nurture a troubleshooting environment will not develop or support analysts. It is not hard to picture an environment where the thrust is always to keep the processes running. When downtime occurs the pressure is clearly to get up and running again. This is the perceived environment in most manufacturing facilities.

Managers create the environment described above when they consistently ask for runability and not for precision. Real solutions to problems are unlikely to be found when the persistent question is, "When are we going to get started again?" and not the question, "Have we taken the time to make sure our assemblies and installations are precise?"

Another thought, on the positive side, is that every plant has an enormous cadre of potential analysts in their field people including, of course, their hourly operators and mechanics. To access this potential we must provide:

- **Proper training** - Proper training is training in root cause analysis that is competency based and designed specifically for busy field people.
- **Appropriate management systems** - Appropriate management systems need to address releasing time for continuous improvement and providing needed support mechanisms.
- **A means of mentoring** - Mentoring is needed to assure that analysts grow in the proper experiences and to assure that the necessary support cultures emerge.

There is a great deal of money that can be saved and profits that can be made through a vehicle as just described. Estimates project that every dollar spent in creating and nurturing this new way of approaching problems will yield more than eight dollars in return.

Troubleshooting is an arcane term. It conjures up images of on-the-spot evaluations of mechanical failures and quick decisions on courses of action. If a failure repeated then there was an even greater urgency to make speedy decisions because the only thing that mattered was re-establishing product flows. This environment is devoid of precision based on careful analysis. We know it was wasteful because we found that we could not compete in a world of innovative thinkers that are reducing staffs and other resources by learning and applying newer, more insightful, approaches.

Even though most thoughtful executive managers are driving change through one medium or another, field people (including many of their managers) continue to have the paradigms of the troubleshooting era.

To change a culture takes courage - the courage to be bold and perhaps a little bit outrageous. The change agent has to:

- Have a plan for change.
- Get the attention of the employees, hence the need to be somewhat bold and outrageous.
- Put in place new or modified management systems to support new desired behaviors.
- Provide appropriate and effective training in new skills and needs.
- Install a means for mentoring the desired change.
- Design a system of recognition, rewards and celebration designed to drive commitment and behavior to preplanned results.

The new manufacturing culture that is emerging is focused on avoiding undesirable events. It demands a precision environment. This new culture does not accept failure, particularly chronic failure as part of the norm or routine. Every mechanical and process failure and every chronic administrative delay are analyzed for root causes and solutions applied only if they emanate from this careful analysis.

I have tried to explain why it is necessary to bury "troubleshooting" and create a new analytical environment that focuses on avoidance of failures and careful, thorough analysis when avoidance efforts do not work. If we are going to stay in the manufacturing game, we can do no less.

Charles J. Latino, (1929-2007) Founder of Reliability Center, Inc., was a chemical engineer with a background in psychology and human factors engineering. He was a leader in the development of an integrated approach to achieving greater reliability in manufacturing and industrial systems and processes. He served as consultant to many companies in the United States and abroad. He is the author of Strive for Excellence...The Reliability Approach. He has left his Reliability legacy to his wife and five children who continue to spread his visionary Reliability Approach to companies throughout the world.