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**Defining & Achieving the Reliability Culture**  
Charles J. Latino, President & Founder, RCI (1929-2007)  
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*"Courage is the price that life exacts for granting peace. The soul that knows it not knows no release from little things; knows not the livid loneliness of fear, nor mountain heights where bitter joy can hear the sound of wings."*

*Amelia Earhart*

The reliability culture can be described by three words, focus, proaction and priority. These are essential components of reliability. The questions are "to focus on what?" and "proact to what?" Priority gives focus and proaction its direction and support. All three components are of extreme importance if reliability operations are to produce truly outstanding results.

Can we intellectually agree that facilities that focus on the most important issues and that proact to prevent surprises and deviations from effective operation will be most likely to turn in superior results? The writer would like to look at all three of these reliability components from a human aspect because when they do not exist and a poor performance result, the fix is clearly a human issue.

## **Priority**

Priority exists when senior management clearly delineates an institution's direction and assigns responsibilities. There is one more factor management must also put in place, which is, the support mechanisms to facilitate the work of line managers. In this way they dramatically demonstrate to the population involved that they sanction the direction line managers are pursuing. In other words, to use a cliché, of today, they will be "walking their talk".

To effectively perform their part in a needed cultural shift, senior management must aid the focus effort by establishing a rallying vision. The wording of the vision becomes extremely important if it is to influence needed behavior changes. It is one thing to say we want to achieve a 10% increase in market share in five years but it is more of a rallying vision to say we will either be number one or number two in the market place for our products in five years or we will not be in that business. This was, of course, done by Jack Welch of General Electric.

To establish priority, senior management must participate in open debate on the paradigm shifts that will be needed to achieve quantum results. The outcome will be agreement on what thinking must be changed. Knowing this, senior management can provide the necessary support. Senior management should expect some organizational people to yell foul when a change in their behavior is expected. Indeed, if there is no human system noises assume that changes are not taking place.

To sum up, when a cultural shift is necessary to achieve superior performance, senior management must be part of the process. They need to examine what thinking and behaviors need to change, including their own, to get the process started. They certainly need to set out the vision, goals and values that they want the organization to achieve and they have to make the appropriate policy changes. Beyond this they need to provide visible support, track the change agents and clear obstacles.

## Focus

Focus is the directing of human energy and capability to the significant few issues and opportunities that result in quantum benefits. Now, this appears to be so logical we have to ask ourselves why it isn't generally done.

Most manufacturing facilities have, within their fence line, the capability to solve most of their problems yet they continue to be hampered by recurring failure events. In fact, what do most field people do daily but attend to chronic problems.

Two mindsets prevail that are instrumental in limiting our ability to focus:

1. It is career limiting to resist assignments even if they obstruct more important work,
2. To belong, it is important not to object to work assignments, even if it isn't as important as the work currently being done.

Can you argue that these are not representative of the thinking of organizational people probably at all levels? What this represents is a dilemma for most people. Either I work on the trivial many or I challenge my job assignments. The first decision promotes mediocrity, the second may be perceived as insubordination. In fact, challenges to job assignments can polarize relationships between bosses and subordinates.

The answer is to challenge but to do it in a way that is not perceived as being insubordinate. One can do this by using a variety of prioritization techniques. This reduces the challenge to a technique on a piece of paper, permitting the supervisor to see the logic of the challenge. Indeed the supervisor can modify the priority by interjecting his or her own logic. He or she may even use the document to present the field view to their own boss, if necessary.

Some of the techniques for establishing reliability focus are:

### **Managerial Introspection**

This is a way of focusing that requires the management team to examine the health of the organization by first establishing a rallying vision of the future along with the values that they want the organization to represent. This is followed by a day long introspection of the health of the organization for which they are responsible. Finally, a focused plan is developed for moving the organization forward. If the organization is found to be unhealthy, as is observed in many plant organizations, then the result of this session is a twofold plan, one to restore health and one to move forward.

### **Modified Failure Modes and Effects Analysis**

Instead of concentrating personnel solely on the failures that are perceived as being of interest to senior management, or the most dramatic failure of the day, we need to concentrate our trained resources on those failures that are most important to achieving and exceeding our financial targets. To do this, a very effective technique, developed in the aerospace industry, has been simplified and made user friendly making it applicable to the continuous process industry. The result is a method that captures vital information held by people in the field that is usually not found in our data systems.

Consequently, a modified version of Failure Modes and Effects Analysis uses field resources to develop the information that identifies which failures represent 80% of facility losses. The technique, although somewhat subjective, is powerful and very capable of identifying the significant few failures that should be subjected to Root Cause Failure Analysis

As employees of companies, it is our tradition that orders for performing work comes from our bosses. It is also our tradition that objections to such orders are not usually tolerated. Since traditions are our paradigms, they have the effect of promoting mediocrity. They also represent a dilemma for employees....do I challenge job assignments or do I continue to work on the trivial many? Decision by pairs is one technique that provides a vehicle to challenge work assignments in a non-personal way. It allows a list of jobs that need attention to be prioritized by comparing each job with each of the other jobs to be done and then sorting the list according to how many times a particular job is selected.

### **Priority Matrix**

Priority Matrix is a technique that is two dimensional. This means that instead of comparing the importance of one job with the importance of other jobs, we can sort on the basis of the impact of a job as well as the ease of achieving the job.

When we allow subordinates to question priorities we are, in effect, allowing limits to be challenged and opening up our plants to some very real progress.

### **Proaction**

I define proaction as any improvement, foresight and/or execution activities that will prevent equipment, process or human failure or lessen the consequence of failure.

I want to discuss, in human terms, mechanical, process and human proaction.

### **Mechanical Proaction**

To achieve mechanical proaction we must predict how our machines are failing or are likely to fail. When we discussed Focus we talked about a technique called Failure Modes and Effects Analysis, a tool to help us identify failure modes. Having knowledge of failure modes, we can take steps to avoid these occurrences and develop early warning signals of their impending happenings. What is generally missing are standards of acceptable performance and how to achieve them. Take for example rotating equipment such as pumps, pacesetters are using standards that are getting them six years average life on their pumps instead of the two years that is generally found acceptable. To understand how to achieve this higher standard let us examine three vital up front activities that we perform to put rotating equipment in service: namely, balance, assembly and alignment.

**Balance...**Manufacturers use ISO balance standards when they supply our rotating equipment parts. ISO G6.3 is generally used for pump impellers, pump couplings and sheaves. This standard will provide orbits or whips in shafts that are 6 to 7 times higher than API standards. If we ask manufacturers to provide API standard they will usually quote outrageous fees. However, experts advise that to go from ISO G6.3 to API standards requires only two to three extra spins on the balance machine with a spin usually taking from 5 to 15 minutes. So a more appropriate question to the supplier would be "how much per hour do you charge for the balance technician?" since all we want is an extra 45 minutes of the balance technician's time, at the outside.

Those of us that are relying on outside balance shops for repairs must assure ourselves that the contract shops are using appropriate standards and that assemblies are being balanced, not merely parts.

**Assembly...**To be a pacesetter it takes great attention to detail during assembly. It means that all parts are carefully examined to look for any marks, scratches and indentations that could possibly become stress risers. It means assuring that every mating surface is carefully inspected for burrs and rolled over edges. It means that every clearance is double checked. It means that there are marks placed by the balance technician so that as those parts are reassembled in the machine, they are positioned exactly as they were on the balance stand. Now

this is not going to get done if the work environment stresses speed of assembly and attention to detail is not recognized and rewarded. I truly suggest in-house training courses focused on this issue of attention to detail.

**Alignment...**Industry certainly has the tools and the methods to align equipment properly and yet alignment is reported as 50% to 70% of the reason for failure of rotating equipment today. The writer finds that most managers that have provided training in the reverse indicator method or the laser method feel that they are getting good alignments. This kind of thinking ignores the training cycle. If prompt practice in the field of what is learned is denied and if there is no follow up to assess skills learned, we can be sure that we are taking false comfort in the thought that we are getting precision alignments.

One pacesetter organization that was getting two year MTBF's (Mean Time Between Failures) on their pumps required a failure analysis for all failures occurring in less than two years even if it was a day less than two years. What they learned, they applied. As a result they now realize six year's life and are heading for 8 years.

### **What about cost?**

Consider an average plant that has 1200 pumps and average repair cost of \$5,000/pump. This assumes all costs involved including the procurement & storage costs of parts, cost of supervision & technical support, cost of tools and rigging equipment, cost of overhead burden and finally the cost of person power and their overtime. (We have been advised that this cost may very well be \$7,500 to \$10,000 per pump).

This is a clear savings of \$2,000,000/yr.. It can be more if the people freed up can be assigned proactive work with other equipment including the fixed equipment.

### **Process Proaction**

We know who the performers are in our operating units. What we generally do not know is what factors separate them from the average field operating person. When we think of these performers or groups of performers, we generally recognize their fine behavior traits. This is, of course, normal but what we need to do is define these exemplars not in terms of their behavior but rather in terms of their demonstrated performance.

Once the performance parameters are defined, usually in terms of quantity, quality or cost, we need to define the gap between the exemplars and the average producers. It is likely that more than one measure of performance will be needed. It is also likely that, upon reflection, we will find that the parameters that we are seeking are not currently being measured. If this is the case, it will be necessary to set up the means to measure the performance gap.

Once metrics are put in place, they will define the performance gaps so that the opportunities to improve average performance can be realized. Analysis of the gap may reveal that the average operator lacks confidence in their ability to handle some off standard conditions or perhaps some shifts have better teamwork than others. Whatever the case, it is incumbent on management to develop a strategy to close the gap.

The tendency is to center our attention on attitudes, yet, throw up our hands when we find how difficult it is to directly influence attitudes. The writer is suggesting that we center our attention on performance to identify exemplars and define the opportunity gap. We then center on analyzing the reasons for the gap and developing strategies to close the breach. These strategies include training, tools, job aids, recognition programs, field reinforcement of learned methods, as well as management system changes. Management system changes may include: speeding up decision making, installing feedback mechanisms, and/or field audits, to name a few.

Human Proaction

Human proaction starts with inculcating productive paradigms. To do this we need to know something about paradigms. Joel Barker's film on "Discovering the Future" does an excellent job of introducing people to paradigms and their effects. If you have seen the film then you will see that the writer's treatment of paradigms complements what Barker presents.

The first thing to consider is the distinction between a mindset and a paradigm. A mindset is a deep seated conviction, value or way of doing something that we, as individuals, possess. When the same mindset is shared by a significant number of people in a population, like a department or plant, it becomes a paradigm. So a paradigm is always a mindset but a mindset may not be a paradigm.

Consider that we are the most technically advanced society on the face of the earth and yet many of us struggle to gain economic advantage over our competitors in other nations. How can this be? The writer has found numerous examples of manufacturing plants being held in bondage by their own thinking, their paradigms. For example, plants that are so used to playing the incremental stretch game that they do not stop to analyze the gap between unrestrained production at their highest demonstrated rate for quality products versus their present situation. This relatively simple task often reveals enormous opportunities.

Some people have expressed to the writer that they tire at the use of the word ... Paradigm. This is truly unfortunate because it conceptually captures the power that our thinking has over our behavior. If we believe in a cause or a direction strongly enough we can do extraordinary things, like landing on the moon. If we believe in false limitations, like not being able, as human beings, of running a mile in less than four minutes, we will find ourselves dead in the water, incapable of any meaningful progress.

The writer has numerous examples of paradigms that have restrained progress:

- Many hourly mechanics believe that management only gives lip service to wanting equipment repaired properly. This perception is reinforced every time management stresses the need to expedite work.
- Most field people are convinced that management's primary interest is in avoiding and responding to large failures, not the chronic ones. This is, of course, the result of centering on large failures without a balanced focus on repetitive failures.
- There is a large restraining paradigm that exists in California, particularly Los Angeles that says 'Because of strict environmental laws, it is impossible for chemical and petroleum plants to compete'. The problem here is that minds become closed to viable strategies for competition in California. For example, the monitoring of fugitive emissions is a cost burden that has to be sustained. But, fugitive emissions testing should represent a driver and an opportunity to cut out, in the average plant, approximately \$2,000,000/yr. in pump repairs by reaching for a new level of precision in pumps. \$2,000,000/yr. far exceeds the annual cost of fugitive emissions testing in the average plant.
- Salaried people have a paradigm that creativity cannot be expressed in many plants because management tightly controls their activities. Some of this results from close and sometimes intimidating supervision as well as from the need to abide by the 'management of change' rules set down by the government. Reasonable means for people to express and use their creativity need to be found to negate this paradigm.
- Many salaried people feel that they must cover themselves with enormous detail rather than say 'I don't know'. Interestingly, management's insistence on details does not seem to promote the attention to details that they are trying to inculcate. It is like preparing for a school test. For too many students the important thing is to know enough detail to answer the test questions. It is usually not to understand the

logic and substance of the work. It is a subtlety but an important one. The writer feels that what managers need to exercise people on, is their thinking processes instead of their memories.

- A general opinion exists that management has trimmed workforces to a point that important gaps in performance exist. Couple this paradigm with one stating that salaried people must work long and audacious hours to protect their career development. The result is a perception that people have to work harder with increasing uncertainty about continued employment. Without a perception of greater stability or growth, the jobs will eventually appear futile to people who perform the work.

It is unfortunate that census reductions take place before non-value added work is reduced, yet, it may be the only way that senior management can realize the financial results needed. Obviously, the answer is to define work that is non-value added and develop means to reduce and/or eliminate it. This will open time slots that can be used to relieve the workload, reduce frustrations, restore home lives, and create the potential for moving people into more proactive activities.

The writer often hears the admonition that operators or mechanics or both are not pulling their load. This is certainly disheartening. Experience tells us that in many of the cases it stems from not holding people responsible for their work.

Manufacturing plants need to establish criteria of performance, not of behavior, and devise strategies to obtain the criteria. The criteria have to be dynamic because management will reasonably continue to ask for the next plateau of excellence. The way people perform, to each level of criteria, will be a measure of their competence.

"Reliability is the job of a central core group, not the job of everyone" is a common refrain. If people do not know how they can participate in an activity, it is reasonable for them to assume that it is some other person's job. This is both an educational and a management system matter.

"Management really wants people that can react and get the facility back on the line". Reaction is too often rewarded, creating a sense of fulfillment for this type of activity. This, of course, perpetuates mediocrity because it discourages proaction and continuous improvement. All that is needed is to change what people get rewarded for.

Finally, the writer often senses deep seated feelings from field people that they are required to use old equipment or push existing equipment beyond its ability to provide consistent flows and quality products. This is certainly a breeding ground for assumptions but it could also be an early warning system if the reasons for the feelings are listened to and evaluated. Feedback to the claimant can help dispel the false assumptions.

Paradigms are often formulated by assumptions that people make about their world. When management makes pronouncements, institutes new policies, or merely praises or criticizes work that has been done, there will be assumptions made. These assumptions might include how people will be affected and how they will survive and prosper. The assumptions made as a response to management's message can very well become deep seated values or paradigms.

So how do we handle this problem of paradigms? The mind is, of course, dynamic, not static. As a result, our mindsets are being continually honed by new information. Regrettably, most of the time we will distort the information to preserve our mindsets if they truly represent our deep seated values. To move people out of their restraining mindsets we must, at times, be prepared, be bold and a little bit outrageous.

One strategy is to change people's jobs. The writer had one client whose organization was not making headway because incumbent managers were shackled in their thinking by the turf that they felt they had to protect. One bright morning the General Manager, my client, came to work and announced that all nine of his managers

suddenly had new jobs. Each of them now had the responsibility of one of their colleagues. What the General Manager did was unshackle them from their past. He gave them a new beginning but he lost none of their experience. And it worked.

We can move people to new environments or we can introduce radically new technologies. Each of these strategies will force the establishment of new thinking. However, often we do not have the liberty to use these strategies. The writer has experienced two additional strategies that work. One is to provide the training and tools to perform the old job to new and more exacting standards of performance. The other strategy requires management systems that provide speedy responses to worker's creativity, thus giving them a sense of fulfillment.

The writer has also seen in-house advertising succeed providing that it is straightforward and honest. The model to use here is the evolution of our approach to safety. In-house advertising usually takes more time because here the thrust is changing attitudes, a time consuming activity. It can be speeded up if it is combined with the aforementioned strategies.

This discussion would not be complete if we neglected to discuss training and alienation, wrapping it together with human error and its consequences. Starting with training, it is imperative for both operating and safety reasons that people know their jobs. They really cannot respond to operating deviations or precision repairs if they simply do not know what to do. Sure they can fake it and get by most of the time because the work environment is quite forgiving and, frankly, so are we. When we allow shoddy workmanship to stand we are contributing to the mediocrity that it engenders.

A familiar refrain of the writer is the advice that because people, for the most part, cannot reveal their deficiencies of knowledge or skill it is incumbent on management to ferret out the educational gaps. The writer suggests that needs assessments be implemented to provide needed information on knowledge and skill gaps.

### **The Next Step is Training**

Once the gaps are determined the next step is training. To train effectively, we must first isolate the specific performance we want to improve, translating it into training criteria.

The training must accomplish two things: it must fulfill a perceived need and it must link to existing knowledge held by the student. For students to absorb information and transform it into personal knowledge, the training information needs to be presented in more than one form to make the necessary linkages.

Additionally skills training must present opportunities for repetitive use of the skills learned. It is necessary to practice the skill in the classroom but it is also very necessary for the supervisors to allow and encourage the skills to be used on the job. This means that the supervisors are a necessary part of the training cycle.

Once the students are back on the job for a time, their performance must be matched against the original criteria to assure the training was effective. To this end the writer recommends that critical skills such as vibration analysis, machine alignment and balancing be assessed by experts to assure that any gaps found can be closed by reinforcement from the experts.

We also have to concern ourselves with alienation because if we are estranged from our bosses, subordinates or colleagues, this excess emotional baggage has the effect of reducing our ability to be sensitive to our surroundings. We need to be sensitive to our work environment to operate effectively and to prevent sporadic failures. The writer recognizes that alienation will never be totally eliminated but we can significantly reduce it, if we are aware of it.

The writer earnestly believes that attention to these key issues: knowing job content and reducing alienation, will significantly influence performance, safety and environmental integrity. This is true because the environment we work in is very forgiving. If we raise our sensitivity to our surroundings a notch or two we will materially affect performance.

The job environment is said to be very forgiving because even though we, as human beings, are error prone we generally survive our own mistakes. We see this graphically in the Error Change Phenomenon. It is reported that it takes 10 to 14 errors and their associated changes before a random event occurs, such as an unpredicted failure, fire or explosion. Because of this, we realize that we need to recognize errors, our own and others, and break the chains leading to disaster. Remember, when we remove a tripping hazard, we are breaking an error chain. When we are too close to another car and maneuver to increase the distance between the vehicles, we are breaking an error chain.

Breaking chains by becoming more sensitive to our surroundings is vital in modern day plants because of the danger of massive injuries and product flow disruptions. The danger is usually very high primarily because of the ever increasing horsepower's and speeds of modern machinery. In addition, the danger escalates with production materials that can cause fire, explosions and chemical or radiation poisoning.

In summary, insuring that field personnel know their jobs and how to perform them will increase their sensitivity to their job environment. Likewise, the reduction of alienation will reduce emotional baggage and increase their sensitivity to their surroundings. Since our world pardons many of our mistakes, in that it takes a multiple of errors to cause a triggered event, this will materially improve operational performance and reduce the chance of accidents and environmental excursions.

Now that what needs to happen has been laid out, we need to understand how we can modify operations to achieve quantum benefits. It has been the writer's experience that such transformations can occur within one to two years and at the outside five years. Remember that many folks promoting such transformations approach the subject by trying first to change attitudes with the belief that improved performance will follow. This can work, but it generally takes between five to ten years to accomplish quantum benefits, and sometimes even longer.

It is the writer's position that change can take place faster by forcing modifications in behavior as long as they do not violate the values of those individuals involved in the change. Thinking will begin to shift if the forced behavior is accompanied by education; participation and experiencing the fruits of new value systems. It becomes apparent that timing is important, the motivation of the people involved is important and the sensitivity and skill of the champion advising and directing this change is important.

A word about the consultant that will most likely advise management and provide training and special expertise. It is vital to have someone that has had direct field experience in transformations. Without it the consultant cannot empathize with the parties involved and understand the particular dynamics occurring in the facility.

The consultant or advisor should not develop a plan for the change. The plan must be developed by the people responsible for operational performance. They will, hopefully, choose to involve various others in the facility. When the plan is final it must be the facility's plan. The advisor should be called upon to review the plan in the draft stage, but he or she cannot be a decision maker respecting the plan. Recognize that it is easy for consultant's plans to fail. It is much harder for management's plans to fail.

To accomplish a transformation that will assure a company's or a plant's ability to compete in the next century, the following changes in thinking need to occur:

### **Presentsight > Foresight**

It will be impossible to compete if companies continue to suffer surprises, whether they be operational upsets, equipment failure or major financial deviations.

### **Recognize Reaction > Recognize Proaction**

We cannot continue to ignore the mountains of psychological evidence that says we respond to recognitions and rewards. As human beings we tend to replicate behavior for which we are recognized and rewarded. It is no wonder that reaction is in big demand since in our society we tend to recognize reaction, not proaction.

### **Criticize Constructive Insubordination > Recognize a Challenge to Existing Limits**

We certainly do not need people who are disruptive but we do need critics as well as people who are creative and inventive. The critics may appear to be disruptive but, if they are challenging existing limits we need their help to boldly move forward.

### **Supervisor Accountability > Doer Accountability**

We need to recognize the role of the current day supervisor. It is to guide, to train the people for which he or she has responsibility and to facilitate their needs to accomplish their work. In this way they become leaders. We also need to recognize that the people doing work should be responsible for their work but are most often not held accountable. Accordingly, we need to create new work environments that hold supervisors responsible for facilitation, training and guiding. Operators and mechanics must be held responsible for their tasks and performance, whether individually or in teams.

### **Restricted Information > Open Flow of Information**

There is surely a greater flow of data today but not information. Data must be reduced to wisdom. It must be presented in a way that helps people convert it to personal knowledge. The science to help us do this is called instructional technology and we have to learn to use it effectively.

### **Do Everything That Comes Up > Do What Is Most Important**

Certainly one of the most powerful impediments to progress is our inability to concentrate talented work forces on the issues in a plant that are MOST important. It is generally conceded that almost everything employees are asked to do in a plant is important. The writer observes that in facilities that have a lot of system noise, confusion and inefficiencies, there is no discernment of what is most important. Plant supervisors and managers certainly need to accept challenges to assignments not viewed as important as the current work and devise means to target resources to what is truly most important

### **Field Procedures That Protect Legally > Field Procedures That Work**

Many, if not most, field procedures are written without knowledge of how the human sensory system and the brain absorb information and use it. Some procedures are written to satisfy legal requirements. Yet, what needs to occur is to develop user friendly procedural products that make great use of graphics, color, instructional technology and human factors engineering techniques. Our goal must be easy understanding of not only how to do something but also why it needs to be done.

### **Spot Learning > Continuous Learning**

We tend to take for granted what people know. We must realize that it is difficult for people to say they don't know something when they are already being paid to perform specific tasks. In many cases they muddle through but they can not provide the precision needed to allow their plants to become pacesetters. The answer is to learn the science of instructional technology and apply it so that people truly know every facet of their jobs. Additionally, we have to strive for work environments where employees feel free to tell us what they don't know or understand.

### **Big Ticket Improvements > Continuous Improvement**

In the United States we have, in the past, concentrated our efforts on effecting big improvements in our equipment and processes. This has often been done at the expense of smaller but needed improvements. Some of our Japanese competitors have been extraordinarily successful in making small improvements work for them. The USA can also make small improvements work for them but they must reduce the bureaucracies that are often set up to handle improvements. This would mean that the burden for following through on small improvements would fall on the 1st line supervisors. Bearing this burden would only be possible if the role of the supervisor is changed as has been stated above. Supervisors need to be relieved of the responsibility for the work of their employees but become responsible for facilitating that work. This is in no way suggesting that plants should relax their responsibility to manage change.

### **Supervisor as Pushers > Supervisors as Coaches**

In the forties we called 1st line supervisors "pushers" because their job was to push the workers, thereby assuring a fair day's work for a fair day's pay. At least that was the theory. Over the years, we have tried to shift this paradigm by relabeling pushers as foremen, supervisors and even managers, yet we still held them responsible for the work. In the future, 1st line supervisors will become facilitators, trainers and coaches while people who do the field work will be held responsible for their own performance. Many forms of this scenario are beginning to appear but, in many locations, our old mindsets are formidable barriers to progress in this regard.

### **Non-Value Added Work Accepted as Routine > Non-Value Added Work Continually Pruned**

In plant after plant, we hear the lament that staffs have been cut so much that it is impossible to pursue proactive work. Yet, in these plants one can observe a preponderance of non-value added work being done. Price Waterhouse reports that between 88% to 92% of all the work done in American factories is non-value added. When we make up our minds to do something about this we will begin to open pockets of time for proactive activities.

### **Identifying Potential Failures > Reducing Potential Failures**

We have come to believe that the more progressive plants have reliability groups that predict potential failures. What we must remember is that true reliability can only be realized when we reduce our dependence on prediction. This is not to say that prediction is not important but more important is the need to prevent the need for prediction. We do this by increasing the preciseness of our work. We no longer accept the standards of the past but adopt new higher standards of workmanship for equipment, parts, assembling equipment and processing products.

### **Focus on Sporadic Failures/Problems > Focus on Chronic Failures/Problems**

Our practice has been to avoid and study our more catastrophic failures. Certainly on the surface this is hard to argue. However, as we discover that the chronic failures are costing us more over time than the larger sporadic failures, we begin to see that there is a need to shift our focus. What has been fooling us is the frequency factor. Without multiplying by frequency our small failures remain small but when multiplied they become huge. The writer is not advocating abandoning efforts to avoid sporadic failures but he is advocating a shift in focus.

### **Discipline People Who Make Mistakes > Find Management System Causes**

The theory has been that if we punish people for making mistakes they will not repeat them. Further, as the punishment is subtly made public their colleagues will also avoid the same mistakes. This sounds logical but it has not worked. Failure rates are rising. The explanation lies in the "Error/Change Phenomenon" that we already discussed. When we have a sporadic event like a fire, explosion or merely an equipment failure there is a multiplicity of errors that lead up to the event. When we punish an individual for his or her mistake we drive the information on the other 9 to 13 mistakes underground. Thus, we have not really solved the problem because we did not uncover all its root causes. This needs to change. But to effect the change we have to shift a very old paradigm.

## Prerequisites for Transformation

These represent the changes that are needed. The question remaining is how do we change or transform to achieve quantum benefits and provide a work place that has less stress and offers more fulfillments. We start with the following prerequisites:

**A. Identify the status quo** - In the writer's view this should not be done by inside consultants as plant politics will usually influence what goes into the assessment report and how it is stated. If the reviewer is concerned about who might influence his or her career in the future he or she will not write an unbiased summary of their findings. It is also possible that if the inside reviewer feels that he or she must let the plant know how serious the management takes low plant performance they might be harsher than the study results demonstrate.

The assessment should be pointed at needed performance and the reasons that it is not being achieved. It should be fair but candid, not sugar coated, to get everyone's attention. The writer likes to be candid in the draft report and then allow the client to wordsmith to blunt the sharp edges if they desire. This allows the raw message to penetrate to those that have the decision power to make necessary changes.

The assessment must include recommendations and it must prioritize those recommendations because they represent an added work burden to the plant. Usually the recommendations can not all be done at the same time.

**B. Accept the status quo** - Probably the most difficult step is to accept the criticisms embodied in the findings and conclusions of an assessment. This is generally a matter of pride. The first impulse in many cases is to deny that what is found really exists. The second impulse is to get angry with the messengers, that is, the assessment team. Although this is a fairly normal response, it demonstrates a real barrier to success. The writer submits to the reader that the managers that can accept the criticisms of an assessment and move ahead have the greatest potential to be pacesetters.

**C. Design the vision of the future** - Moving ahead in this context means knowing the direction to travel. A pacesetter management is one that will layout the future, one that has a vision of where they want to be in 3 to 5 years. This management team has the creative ability to present the vision in a fashion that engenders excitement and commitment among themselves as well as the employees that must make it happen. The vision needs to become a cause that employees can rally around.

**D. Find the will and the courage to navigate the gap** - Whenever we impose a different way of doing things on people we are bound to make them uncomfortable at the onset. Perhaps we remember going into the military service or being promoted into a new responsibility and the unease that goes into approaching the unknown. Indeed, if people are not uncomfortable and perhaps voicing objections, then we would not be changing anything.

The fallacy is that this uncomfortable feeling, this lack of confidence, needs to continue for a long time. If it does continue for a long time, then we are doing something wrong, or not doing something we should be doing. After a few months employee confidence and pride should return. It is management's job to put in place support systems that assist people in this regard.

Because this is a period of turmoil and, possibly, requiring a new style of managing, the period can be most unsettling and challenging to the managers. After all, who has prepared them for these challenges, for possibly receiving agendas from subordinates, for delegation, yes; but for transferring power to lower levels? A good training ground for this kind of management is managing charity work or a parent teacher's association. Because in these activities the leader has little authority and must learn to be persuasive and to be challenged. The writer

assures the reader that the new management style takes personal fortitude and courage, but the result is more satisfying and enduring for more people.

## Transformational Strategies

Now we know the prerequisites, what are the means? The means vary depending upon the organization, its prior conditioning and what needs to be accomplished. Although some consultants would like you to think there is a cookbook and they have it, the writer has not been able to experience "like" situations. Each plant has its own uniqueness. Following are some of the strategies that have worked for the writer. They are not presented as an all inclusive list but can be very effective in the right circumstances:

**A.** The writer believes it is necessary to have a **Reliability Policy**, set out by management, if one does not exist. The policy commits management on a philosophical level to reliability activity. It also sets the priority. It informs every one of management's expectations and management's commitment to reliability. If management is unwilling to set out a policy it is unlikely, although not impossible, that reliability work will take root.

A policy also does another thing, it spells out that management understands what reliability can do for the manufacturing process.

**B.** The writer used to believe that champions were needed to shepherd in reliability changes. But events have also caught up with this concept. Today, the writer believes in the need for a two part shepherding system. We need to **appoint drivers as well as champions** to effect reliability changes. In cases where reliability is merely a vibration monitoring effort or something less and needs to be expanded, we need to have a working committed believer effecting needed change. One of the writer's clients calls this person a **driver**. He or she is in the trenches imposing changes and probably making many people uncomfortable. In fact, if this person experiences no resistance, it is quite likely he or she is not a driver. Because people are being moved out of their comfort zones, the drivers will need mentors or spokespersons that protect them, see that barriers to success are removed and put in place needed management systems. This person needs to be at a higher managerial level. This person is called the **champion**.

**C.** One defines failure as "a machine breakdown", another as "a quality defect" and still another as "an excessive cost". One defines proaction as "forecasting activity", still another as "doing things right the first time" and another as "an improvement program". And what about the concepts, ideas and definitions behind words like "Focus", "Sporadic", "Chronic", "Problem", "Opportunity", "Primary Failure vs. Secondary Failure" and the list goes on. The writer learned a long time ago that we have no means to think without words. We need words to formulate our ideas and communicate our needs. The dilemma exists when there are multiple meanings for the words we use to conduct our business. For this reason the writer believes that it is most useful to present seminars that **establish a common reliability vocabulary**.

**D.** Safety is an entrenched activity in most, if not all, continuous manufacturing plants. But it was not always this way. The writer remembers the difficulties in getting employees to wear safety glasses and hard hats. They complained of impaired vision problems, headaches and even more profound damage to their brains. But management prevailed and today these, and many other safety practices, are done by rote. How did this happen? There are multiple answers but most important was **in-house advertising** with a consistent message. The banners, posters, safety films, safety gifts, hard hat stickers are all means of advertising and they have a proven record. This model will also work for reliability.

**E.** To progress reliability, various types of training will undoubtedly be needed and will have to be provided. If employees do not know how to do their tasks, they cannot perform. It is as simple as that. Training in **Equipment Monitoring** is often needed. This includes vibration, infrared thermography, eddy current testing and acoustical testing. The training needs to be hands on as well as interactive lecture. Additionally, the

trainee's supervisor needs to be a partner in the training. He or she must provide opportunities for using the training and they must monitor the learning curve and assure proficiency. These steps are vital because all too often it is assumed that trainees have the proficiency merely because they attended a training course. This often leads to a false sense of security.

Training must also include **Root Cause Failure Analysis** to establish a cadre of principal analysts for attacking the "Significant Few", those failures that represent 80% of plant losses. It must also make provisions for training field level people in **failure analysis and problem solving** to assure continuous improvement. It is essential that such training focus on verification of potential causes and at uncovering the basic roots of failures.

For these activities to succeed it is imperative that supervisors and managers receive overview training so they understand the vocabulary and can develop meaningful expectations assuring a return on the training dollars. Supervisory training may have to include **facilitation and coaching** instruction.

**F.** Unfortunately, prediction efforts are, most often, considered part of maintenance and, as such, designed to be a maintenance job aid to warn of latent failures. This is a restraining paradigm that has its roots in the methods used to market prediction instruments. We need to shift this paradigm so that people in manufacturing recognize that when prediction is broader based, and is used against **higher standards**, runnability can materially improve. For example, we should be predicting the effects of management pronouncements on our ability to produce. We should be extending trend lines of operating variables to warn of impending yield and quality problems and we should establish **higher standards** for acceptable vibration to improve equipment life. Using this broader approach, when prediction is joined to root cause failure analysis one can expect no less than quantum results.

**G.** Maintenance efforts have for too long been directed toward short term runnability. Management must continue to insist on uptime but with cautions against focusing on short term operations.

**New standards of excellence** need to evolve that recognize precision in every assembly that is installed in the field. For this to happen, something has to change. For example, our shops have followed the same design pattern that we had in the forties and fifties. Dust and dirt are allowed to infiltrate and operations such as welding, machining, grinding, and in some cases sand blasting, coexist in the same space where equipment is assembled. Clearly we can see the lack of logic in this ever present scenario.

We need to revisit our engineering standards and assure ourselves that they reflect the higher level of precision that we will need to compete in the coming years. If we are committed to outsourcing maintenance elements such as balancing, valve repairs and motor overhauls, we need to have people that have the training and the skill to audit these activities to assure compliance to the best standards available.

**H.** To achieve transformation, management must select **the proper time to involve their field people**. This expert cautions against field employee involvement in the necessary culture changes until a critical mass of plant management people are truly on board. The writer has found that it is more effective to work on the management for as long as it takes to bring the most influential members on board before exposing the field people to reliability concepts.

When the facility is ready to expose field people to the new concepts, it should not merely be a training exercise but a growing, learning experience that is exciting and entertaining. It should involve presentations that hold their attention, discussions, exercises and field assignments. It must not be a one shot exposure but one that is spread over a period of a year or more so that the seeds can not only be planted, but also nurtured. To do this successfully management will have to institute management systems that will allow synergy between supervisors and wage roll employees, feedback systems, recognition for sought after behaviors and celebrations for meeting new performance targets.

**I.** The goal of the new approach to manufacturing should be no surprises and ever increasing mean times between equipment failures. To set up the environment for this, management has to promote and keep reinforcing focus and proaction. They need to provide the tools and the training. They need to examine all their pronouncements with a sense of system. This means they have to anticipate how their supervisors and field people will react to what they say.

The writer believes that management has to **find a growth message in their visions of the future**. The absence of such a message is to promote effective operations with a clear expectation of census reductions. The writer is not suggesting that employment be guaranteed. He is suggesting that we provide visions that promote stability and excitement. Our result can then be the commitment that emerges when people feel growth is the expectation of higher and higher levels of precision and attention to detail.

**J.** The barrier of resistance today, after all the reductions in levels and in staffs, is the perception that there are no more people available to make the transition from reaction to proaction. Everyone is overworked and under considerable stress. The writer is sympathetic to these protestations. They are most often heard among line managers and supervisors and for the most part they seem real. However, there is a wealth of potential time available if two actions are taken. First, boldly push the concept of **focusing on the most important issues**. Those issues that are revealed by utilizing a focusing technique, not the unchallenged notion of someone in authority. This may sound easy but it is hard and it takes courage. Second, engage in strategic change sessions to **identify non-value added work** and be prepared to have management accept or reject plans to eliminate or mitigate this type of work on the spot. If these two activities are purposely followed, time will make itself available.

**K.** Now, how do we do this quickly? We first determine the gaps and provide the tools and the training. We, then, establish accountability and develop the means to enforce it. Finally, we establish the **rewards and/or forms of recognition** that will be bestowed on those individuals that exhibit the new behaviors. We may not like to think that we are creatures that respond to reward and punishment but the fact is that it works. What separates us from other living creatures are that our needs and motivations are highly complicated and very sophisticated. Therefore, rewards and/or recognitions have to be carefully designed so that a flexible system evolves.

**L.** Recognizing that the road to quantum successes is bumpy and has an inordinate number of pitfalls, it is unlikely that we will achieve success if we do not set up metrics to gauge problems and announce successes.

**M.** Finally, we need to **celebrate performance successes**. This is different from preceding paragraph "K" where we were recognizing specific behaviors. Here we recognize quantum level performance.

In summary, the writer has experienced manufacturing locations that have outstanding successes. Because of this experience and the writer's observations of manufacturing, generally, he is enthusiastic about our future. We have always found the will and the courage to rise to the occasion. We are currently on the move and are experimenting with a number of means. We are pointed in the right direction.

The Reliability Approach works. It is the infrastructure that supports organizational health, quality, safety and environmental integrity. To achieve the challenge of setting the Reliability Approach in place will require a number of conditioned paradigms to change. This will take boldness and courage. We are up to the task. If we can delineate the challenge in an uplifting vision we can even have fun realizing extraordinary performance far beyond what we have become conditioned to expect.

*"Most people live, whether physically, intellectually or morally, in a very restricted circle of their potential being. They make use of a very small portion of their possible consciousness, and of their soul's resources in*

*general, much like a man who, out of his whole bodily organism, should get into a habit of using and moving only his little finger. Great emergencies and crises show us how much greater our vital resources are than we had supposed."*

*William James*

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*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 was 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.*