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Essays in Industrial Safety

Editor: Curt Lewis, P.E., CSP

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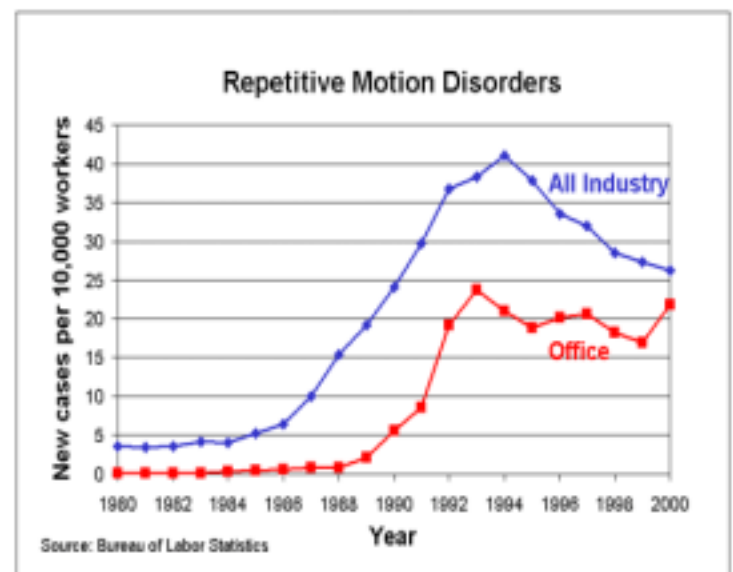
Included in this issue are several excellent essays written by students in my recent graduate Industrial Safety course. Their hard work is very appreciated.

Thanks,
Curt

Ergonomics Defined

What is ergonomics? “Ergonomics is a multi-disciplinary science dealing with the interactions between people and their total workplace environment. In simpler terms, ergonomics is the science of designing the workplace environment to fit the capabilities of workers (Advanced Ergonomics, 1994).” The workplace is comprised of many areas that employees must interface with in order to achieve the organizations objectives. The physical environment of the workplace can be broken down into the tools required to perform a job, the task to be performed and the workstation provided by the employer to perform their duties. All three of these must work in concert to ensure that an employee has a safe injury free work environment. So what is the big deal, people have been working for hundreds of years without ergonomic programs. The big deal stems from the proven ability of applied ergonomics programs to reduce injuries in the workplace and save employers money.

Each year billions of dollars are lost due to work related injuries. More specifically, musculoskeletal disorders (MSD) make up the majority of reported injuries. MSD’s result when there is a mismatch between the physical capacity of the workers and stress of the task to be performed. “Musculoskeletal disorders are the leading cause of disability of people in their working years, afflicting over 19 million workers. About one third of injuries result from overexertion and repetitive motion. The cost to the nation in workers compensation claims exceeds \$20 billion (The National, n. d.)” In addition to the costs of workers compensation claims, employers are also losing millions of dollars in lost work time and decreased productivity while employees recover from their injuries. As stated earlier, work related injuries have been occurring for hundreds of years, but it wasn’t until the late 1980’s that anyone really started seriously making the connection between ergonomics and the work environment. The most common injury occurring in the workplace is repetitive motion disorders. The Bureau of Labor studies show that these disorders not only make up the majority of work related injuries, but they are also on the rise. The graph is from the Bureau of Labor Statistics illustrates their findings.



The Occupational Safety and Health Administration (OSHA) also took note of the rising problems associated with work related injuries and took action to encourage employers to install ergonomics programs. In April of 2001, OSHA instituted a four pronged approach to implement its ergonomics program. The first of its four pronged approach involved ergonomic guidelines. OSHA developed industry task specific guidelines for industries with high rates of injuries on the job. The second part of their plan was enforcement of the standards. The primary goal of OSHA is to reduce injuries and illnesses in the workplace. OSHA required employers to keep their work areas free from hazards to include ergonomic hazards. "OSHA will conduct inspections for ergonomic hazards and issue citations under general duty orders and issue ergonomic alert letters where appropriate. OSHA will conduct follow-up inspections on investigations within 12 months of certain employers who receive ergonomic hazard alert letters (Occupational Safety, 2001)." OSHA will also conduct specialized training of appropriate staff on ergonomic hazards and appoint ten regional coordinators to inspect and offer guidance on ergonomics in the workplace. The third aspect of the approach involves outreach and assistance. For many organizations ergonomics is something they have heard about, but have no real experience with. In order to meet this goal, OSHA will develop ergonomic training tools and provide educational training at its 12 educational outlets. The final portion of their four pronged approach will involve research. Research statistics have already shown that the cost of work related injuries and the most common types; however the research has mostly come from private organizations. OSHA will conduct its own research for two very important reasons. The first to ensure that their emphasis is placed on the appropriate area and that they cover as many of the possible areas for injury as possible. The second reason is to see if the statistics prove that the implementation of their program is working. OSHA is taking great steps to create awareness and ensure employers due everything possible to mitigate work related injuries. The biggest challenge facing the employer will be changing the way they conduct business. Many organizations have been conducting business the same way for years and for some, old habits are hard to break.

Implementing an Ergonomics Program

In order to effectively implement an ergonomics program, the employer must be aware of the areas that need be corrected. Good health and risk factor surveillance is going to provide critical information. "Surveillance refers to the ongoing and systematic collection, analysis, and interpretation of health exposure data in order to describe and monitor

health events (Virginia Polytechnic, 2002).” A surveillance system should be comprised of two components, passive and active surveillance. Passive surveillance should consist of existing records and data collected from OSHA 200 logs to identify incident patterns of injuries and illnesses and potential problem areas on the job. Active surveillance should come from the employees. This might include surveys, discussions with employees or comments from first line supervisors with first hand knowledge of problem areas. These steps are often easy ways to rapidly identify problem areas and implement corrective measures. Employees of an organization are truly their most valuable resource. Without them nothing gets accomplished. That is why their support of an ergonomics program is so important.

To effectively implement ergonomics program a company will have to have top to bottom support. This means that from management all the way down to workers in the trenches must receive training and be able to provide input into the program. Establishing an ergonomics program will not be easy, but if done correctly it will offer benefits to both the employer and employees in the long run.

Supervisors are essential to promoting and establishing an ergonomics program. As a supervisor they are responsible for promoting and maintaining a safe local work environment. Supervisors must also be given the freedom and funding to implement corrective measure identified. Often they are already aware of problem areas and can provide first hand knowledge of ways to correct them. Employees are also essential, if not the most important aspect of implementing a program. Changing the way employees think and perform their jobs is no easy task. Many employees see new programs come and go and they are often dismissed as the boss’s way of turning a quick buck with little or no benefit to them. Some however will see the benefits, particularly the ones that have been affected by work related injuries. The key here is for the employees to have some kind of tie to the program. The development of an ergonomics working group or network with employee representatives can be effective in encouraging new ideas and participation in the program. An ergonomics program must not be viewed as direct orders from supervisors and upper management. An ergonomics program must have full participation from everyone involved in the company.

Once you have employee support for the program, they will be able to provide critical and important information to the job analysis and design phase of the ergonomics program. The job analysis and design phase involves identifying repetition components, force components, postural issues, work organization issues, and environmental issues. The

employees are your single best source for identifying these areas and offering solutions to correct the problem. In some cases it may be necessary to hire an ergonomics consultant to come in and assist by providing scientific analysis or engineering expertise to the problem. In many cases the corrective solution may be simple enough for an employee with ergonomics training to solve. Either way, the organization must be prepared to devote funding to solving the problem if necessary. An ergonomics program cannot be successful without the support of upper management.

Finally, training is the last piece of the implementation process. OSHA has already committed itself to provide training to company employees. It is imperative that an organization train its personnel. Trained personnel can introduce the concept of ergonomics, explain why the program is necessary, provide training to other employees, and describe benefits of the program. Training staff members to correct problems will not only reduce injuries, but save money in the long run. Training has a second benefit in that trained employees now also have the knowledge to eliminate future potential problem areas before they arise.

Now that the implementation steps have been identified, the company must now monitor itself to see that the program is producing the desired outcome. Passive and active surveillance steps are not a one time review. They must be reviewed periodically to see that the program is working. "The ERGO model has been found to be an effective tool for organizations to use in identifying a problem. The E stands for express-tell others about perceived ergonomic risk and health effects. The R stands for review-carefully look at tasks to discover the type and degree of ergonomic risks. The G stands for guide-provide a range of solutions to minimize risk. The O is for open-be willing to implement and use new equipment and methods (Virginia Polytechnic, 2002)." An ergonomics program is not a one time fix and your done kind of program. A good ergonomics program is an ongoing part of an organization that brings about a culture change for all employees from top to bottom.

Task Design

Task design is the meat and potatoes of the entire ergonomics program. After all, the tasks that employees perform are what lead to ergonomic problems. "A task from a classic industrial Engineering perspective is an activity with a definable start and endpoint (Advanced Ergonomics, 1994)." The basic fundamental behind task design is find ways for employees to perform their duties without repetitive motion and so they do not exceed the physical abilities of the worker. To

begin an analysis of task design we must define the parameters of the task to be performed.

When analyzing tasks you need to determine what risk factors are involved. Repetition is the first area to be analyzed. The human body has a natural limit to the amount of repetitive movements it can perform within a given time period. When designing a job, repetition requirements must be determined. "This is typically done by quantifying job cycles per unit time (Advanced Ergonomics, 1994)." What this comes down to is determining the frequency of the work to be performed and the number of repetitive movements involved. To minimize the risks associated with repetition, the job must be designed as to limit the number of repetitive motions performed within a given time period. "Some basic guidelines for determining a repetitive motion include 7,600-12,000 exertions (forceful motions) per shift, 1,000 damaging wrist motions per hour, and shoulder abduction occurring more than 500 times per shift or 63 times per hour (Advanced Ergonomics, 1994)." These are just some of the many examples of repetition that occurs on the job. Each task has its own unique requirements and circumstances, and each task must be thoroughly reviewed for excessive repetition before it is to be performed.

Posture on the job is also an important aspect of task design. Certain tasks being performed may require the employee to place his or her body in awkward positions. In some cases these positions may be uncomfortable or impossible to sustain for long periods and may result in injury to the worker. "Workstations should be designed to accommodate the persons who actually use them; it is not sufficient to design for the average or typical worker (David L. Goetsch, 1996/2002)." This idea holds true whether the employee is primarily exposed to an office environment or they someone exposed to a mechanical environment. The neutral posture position is the preferred when performing on the job. "For an employee that is required to stand, the position would be standing perfectly erect with arms resting by their side, or elbows bent at a 90 degree angle with the wrists straight so that the hands are in the handshaking position. For an employee that stays primarily seated to perform their duties, the neutral position would entail a natural curvature of the spine, with arms resting at their sides, elbows bent at a 90 degree angle with the wrists straight so that the hands are in the handshaking position (Virginia Polytechnic, 2002)." Designing the work center around the task would probably include strategic placement of the computer keyboard, mouse, and monitor. It might also include the strategic placement of step-stools so that employees do not have to reach to perform a task, or redesigning work benches by placing tools in easy to reach

areas. The important thing to remember is that these are just a couple of examples. Each task is unique and the task must be designed around the person.

Environmental conditions on the job are also areas that can cause problems for employees. For many workers heat stress can be an additional source of discomfort or injury. To measure heat stress we need to look at a few primary factors. The first being environmental heat sources. These may include working in direct sunlight, working in a poorly ventilated space, or working around machinery that produces heat. In any event all of these can provide varying degrees of discomfort. Even with the proper tools and work area, prolonged exposure to a hot environment will lead to negative consequences. Dehydration can lead to heat stress, or even heat stroke. Proper clothing is essential. Loose fitting clothing will allow the skin to receive fresh air and allow for evaporation of perspiration which is the body's natural cooling mechanism. Some jobs may require the wear of safety gear. To avoid the problems associated with environmental hazards you need to ensure that adequate water is provided and encourage its consumption. Dehydration results in mental errors, and mental fatigue. When possible the work area should include well ventilated areas and provide shade to avoid over exposure to sunlight. Above all else, make sure that adequate rest periods are put in place to allow employees to cool down.

Duration and recovery time are the final areas that must be addressed when designing a task. In some cases it might be impossible or impractical to design a work center that is ergonomically correct or is free from repeated repetitive motion. In these cases it is absolutely essential that the employer provides adequate rest periods and recovery time. Recovery time would include periodic breaks during the work day and in some cases limiting time spent to conduct certain task during the day to just a few hours or less. Each case is unique and different job tasks will require different rules to be applied to minimize injury.

The primary goal of task design is to minimize cumulative trauma disorders. To effectively do this the employer must do everything possible to eliminate or mitigate on the job risks. Keep in mind that designing the task around the person may be expensive, but in the long run the expense pays for itself through improved employee job satisfaction and decreased employee absences due to injury.

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Essence Of Accidents

In a typical year, work related accidents cost \$48 billion and injure more than 7,100,000 workers. On average there are 3 injured workers per 100 workers and 1 accidental death every 51 minutes. Crippling injuries take place on the average of 1 worker every 19 minutes. These figures are staggering considering that the workforce is 146,000,000 strong.

Many traditional theories about the causes of industrial accident and disease focus on the worker. Consider the following:

Some workers are simply 'accident-prone'. Their bad luck draws accidents to them. Despite research into the statistics of accidents, no one has yet proved the existence of "accident proneness."

Workers are 'careless'. Worker carelessness is the cause of most accidents. The notion that workers do not care whether they injure themselves or not is insulting at best, a conspiracy to blame the victim at worst. Recent "behavior based" approaches to safety focus on controlling risk-taking behavior by individual workers. Yet risk taking in workplaces is often encouraged, unconsciously or not. People take more risks when they feel rewarded for taking them, when they receive mixed messages about the importance of safety compared to production, and when risk taking seems to make sense of a high stress, high risk workplace environment ("At least the risks I take are the ones I control"). In other words the lack of a "safety culture" encourages risk taking.

Some workers are more susceptible to injury or disease than others. This theory leads to intensive pre-employment screening to ensure that only the healthiest, fittest applicants are hired. Despite all this effort, research has shown that pre-employment medicals are rarely predictive of future illness. As for injury, workers who have at some point received Workers Compensation, and workers who were previously healthy, do not have significantly different numbers of injuries or illnesses.

Lifestyle choices cause most diseases. We all have a right to make lifestyle choices: some will make wise choices; some not so wise. How far does the power of the employer extend into our private lives? Consider cancer. Smoking and diet are the two leading causes of cancer. We often forget that occupation is the third leading cause. This represents a great many cancer deaths that the victims had no choice in at all.

All activities, including work, contain an element of risk. When people in the workforce find employment they

voluntarily accept the risks that come with the job. This statement assumes that:

- 1.The labor market is totally open with zero unemployment,
- 2.the workplace is democratic
- 3.complete and detailed knowledge of the risks associated with different occupations exists
- 4.the pay in different jobs is based solely on the risks and hazards
5. people describe their careers for only one reason, i.e., comparing risk to pay.

These are all false assumptions. People work to live, not to die. In all of the above simple theories of accident causation, the focus is on the individual worker. Prevention therefore consists of protecting workers from themselves.

In reality, work is not an individual activity, but is social and organizational in nature. The ability of each worker to decide how to work at any given moment is limited by the supervision, the tools and equipment provided, choices already made about the process of production and workplace design, the actions of co-workers and supervisors, operating instructions and procedures, specifications and market demand, and so on.

In order to understand accidents and more importantly prevent accidents we need to know why accidents happen and what causes them. Accident causation theories are used as models to predict and prevent accidents. There are six main thoughts of accident causation. Some are dated while others are new. Most draw from the first known theory, the theory known as the Domino Theory.

The Domino Theory

The early pioneer of accident prevention and industrial safety was Herbert Heinrich, an accident investigator with the Travelers Insurance Company. In the late 1920's, after studying some 75,000-accident reports, he concluded that 88 percent of all accidents are caused by unsafe acts committed by fellow workers. Roughly 10 percent are contributed to unsafe conditions, while the remaining 2 percent are contributed to accidents that are unavoidable. In 1936, Heinrich suggested the "domino" theory of accidents. His idea was that accidents are a sequence of events in a predetermined proceed/follow relationship, like a row of falling dominos. This view changed the thrust of investigations toward the events involved, rather than the conditions. It represented a redirection of the search for understanding of the accident phenomenon on the basis of a "chain-of-events" that had occurred. His study laid the groundwork for what has been known as the Axioms of

Industrial Safety. While most safety theoreticians refute his studies, his Axioms are often the basis for other philosophies.

Heinrich's Axioms of Industrial Safety

1. Injuries result from a series of preceding factors. Most accidents can be traced to a root cause.
2. Accidents occur as the result of physical or unsafe act.
3. Most accidents can be attributed to unsafe behavior.
4. Unsafe acts or behaviors do not always result in immediate accidents or injury.
5. Understanding why people commit unsafe act helps to establish guidelines for corrective actions
6. The severity of the injury is largely fortuitous, and the accident that caused the injury is preventable
7. The best accident prevention techniques are analogous to best quality and productivity techniques.
8. Management should assume safety responsibilities.
9. The supervisor is the key in the prevention of industrial accidents.
10. The cost of accidents must include both direct and indirect costs. (Goetsch, 2002)

Heinrich also believed that there are five factors in the sequence of events leading up to an accident. These factors can be summarized as follows:

1. *Ancestry and social environment.* The mental and emotional character of the individual. This can be a negative trait and may lead people to behave in an unsafe manner or can be an inherited trait driven by surrounding or social environment.
2. *Fault of Person.* This is a negative trait as well. Can be traced to a person's predisposition to unsafe behaviors or intolerance to follow the norm with respect to adherence to standards for hazardous conditions.

3. *Unsafe act or mechanical/physical hazard.* Unsafe acts that are committed by people and mechanical or physical hazards are the direct cause of accidents.
4. *Accident.* Typically, accidents that result in injury are caused by falling or being hit by moving objects.
5. *Injury.* Typical injuries resulting from accidents include damage to soft tissue, broken bones and/or lacerations. (Goetsch, 2002)

As a side note, the accident "reconstruction" approach emerged not long thereafter, which was refined extensively in the highway accident investigation field of specialists. The reconstruction focused on identification of the linear chain of events theory of the accident phenomenon. The simple who, what, where, when and why questions of an accident. About the same time, air safety investigators contributed another milestone in the accident investigation field. The Civil Aeronautics Board published the first chart on which were plotted the flight data recorder data. This chart was the first display of the parallel events along a time scale, showing what can be viewed as a "multi-- linear events sequence" on which the findings were partially based. It also is the predecessor of the multi-linear events sequence theory for the accident phenomenon.

Human Factors

Human factors, often overlooked, can include fatigue, stress, shift work, and the ergonomics of workstation, tool, and equipment design. Even something as simple as a dial or a knob must be perceived and understood by the human operator to be useful. Social norms dictate that we expect things to behave in a certain way - for example, we expect pointers on instruments to show "more" of something by moving clockwise, to the right, or up rather than counter clockwise, left, or down. We understand green to mean "safe" or "operable," while we understand red to mean "unsafe" or a "stop" condition. It has been shown that, despite training in some instances, people rely on their "social norms" in moments of high stress. A majority of the time spent by military and firefighters in particular is that of training. This conditioning allows them to run on motor memory while in high stress situations. The human factor theory of accident causation attributes accident to the failure of the system through human error. Three broad factors leading to human error are, overload, inappropriate response and inappropriate activities. (Hawkins, 2001)

Overload

Worker capacity is measured in terms of productivity, or load, be it in the form of manufacturing or clerical, load can be measured to evaluate ones productivity worth. Many factors effect worker load capacity; natural ability, training and state of mind are but a few. If these factors reach a crescendo in the workers productivity, overload is reached. Overload is a syndrome where the workers natural capacity for productivity is overwhelmed. Most often accidents are a result of worker inexperience or lack of progressive training. If a new piece of equipment is added to the work floor or a new production technique is introduced to the worker, is training accomplished or not far behind? In the name of efficiency many production lines are often a torrent of manufacturing changes to improve product quality and value even as the first run is being shipped to customers. Other factors that influence workers capacity is fatigue level, stress and physical conditioning.

Forced operator error often occurs because of production demands imposed by the owners of the enterprise. In addition, design of the workplace is a result of decisions made by management. If a system requires 100 percent vigilance, 100 percent of the time to avoid a catastrophe, then we guarantee a catastrophe. It makes no sense to blame the worker/victim when it finally occurs.

Factors that add to the workers burden on productivity are known as environmental factors. Noise, climatic lighting and distractions only add to the overload foundation. Internal factors, or limits on the metal state of worker productivity are personal problems, emotional stress and worry. Situational factors are the physical working environment surrounding workers. These can be stressors such as level of risk, unclear instructions or just the novelty of the job can adversely affect worker load.

Inappropriate Response

How a person responds in a given situation can be the determining factor whether an accident could be prevented or could lead to the cause of one. If a he or she ignores a suspected hazard and does nothing to correct the situation, he or she has responded inappropriately. If a person willingly disregards a safety procedure or circumvents safety locks on equipment, that person has acted with an inappropriate response. (Goetsch, 2002)

Inappropriate Activities

Human error can be the result of inappropriate activities. Often times undertaking a task without the requisite training can lead to injuries. Being unfamiliar with equipment and procedures and misjudging the degree of risk associated with the task is an example of inappropriate activities. (Goetsch, 2002)

Accident/Incident Theory (Petersen's model)

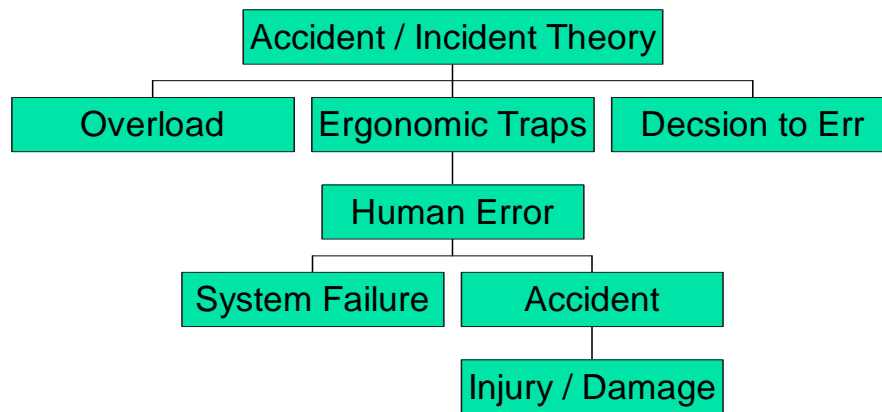
The Accident/Incident Theory or sometimes referred to as Petersen's Theory is an extension to the Human Factors accident causation model. Dan Petersen introduced additional elements such as ergonomic traps, the decision to err and system failures.

In this model, overload, ergonomic traps, and/or a decision to err lead to human error. The decision to err may be conscious and based on logic, or it may be unconscious. A variety of pressures such as deadlines, peer pressure, and budget factors can make a person decide to behave in an unsafe manner. (Goetsch, 2002, p. 39)

Although Petersen stresses logical decisions based on circumstances/situations, imbedded in the same phrase can be the "Superman Syndrome". This leads the person to believe that they are invincible or bulletproof, simply because "it won't happen to me, accidents happen to others who don't pay attention".

Petersen's addition of the System Failure is an important step in identifying the potential for causal relationship between management decisions/management behaviors regarding safety. System Failures also helps establish and solidifies management's role in the accident prevention process. Also, it helps identify management's role *and* avenues the system can fail. According to Petersen's Accident/Incident theory:

Management does not establish a comprehensive safety policy. Responsibility and authority with regards to safety are not clearly defined. Safety procedures such as measurements, inspection, correction, and investigation are ignored to given sufficient attention. Employees do not receive proper orientation. Employees are not given sufficient safety training. (Goetsch, 2002 p. 40)

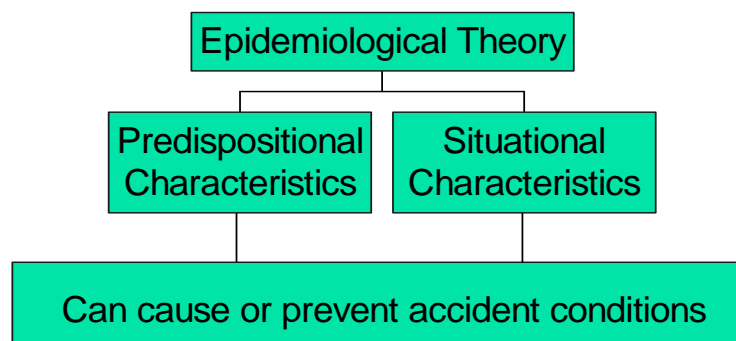


Petersen’s Model of Accident/Incident Theory

Petersen’s sub class in the System Failure block reiterates management’s role in adhering to, and enforcing safety standards within the work center. Management’s role within this block is multi-layered. They are responsible for setting policies, placing responsibility, training employees, following up the training and enforcement of policies with inspections to ensure compliance, and finally enforcing standards with corrective actions. If at anytime, management attention is diverted from the system, a failure will occur.

Epidemiological Theory

This theory focuses its energy on industrial hygiene, and the causal relationship between environmental factors and disease. This current trend includes a broader perspective of industrial hygiene issues. Industrial hygiene concerns environmental issues that can lead to sickness, disease, and impaired health. The Epidemiological Theory is also appropriate for studying the causal relationships between environmental factors and accidents but it should not be confused with casual not correlational relationships.



Epidemiological Theory Model

Two key components in the model are predispositional characteristics and situational characteristics. A predispositional characteristic is one in which a person is very susceptible to peer pressure. They are controlled by the moods and emotional state of others around them. Situational characteristics can best be described as the current state of affairs people are immersed in, whether the situation has them driving to work or doing a goal orientated task. Combine these two characteristics and toss in one bad decision and you have a recipe for disaster.

System Theory of Accident Causation

The System theory is a group of interacting and interrelated components that form a unified whole.

1. Liveware: Man
2. Hardware: Machine Systems
3. Environment: Surroundings

Man, the most valuable as well as the most flexible component in the system. Yet man is subject to many variations in his performance and suffers many limitations, most of which are now predictable in general terms. It might be better to envision the three components of the system as blocks and the edges of the Liveware block (Man) is not simple and straight so the other components of the system must be carefully matched to it if stress in the system and eventual breakdown are to be avoided. Changes in patterns of interaction can increase or decrease the probability of an accident occurring.

In systems theory, the LIKELIHOOD of a system failure increases with increasing hardware complexity. The SEVERITY of the potential outcome increases if time for error correction is short, information to the operator is ambiguous or indirect, and subsystems are interconnected so that one failure can lead to many others in an unpredictable fashion. Complex systems failures like the Three Mile Island nuclear disaster illustrate this point. (Bailey, 1982)

Combination Theory of Accident Causation

The Combination Theory allows us to use any and all of the aforementioned theories to help us determine the root cause or causes of an accident. As an investigator, you must assume that a single theory can't answer any and all accident scenarios. You must also assume that parts of some theories are more adept at accident investigation while parts of another theory might hold preventative measures aimed at attenuation. Using the Combination Theory allows you to draw the best conclusions from each of the preceding theories to accurately paint a picture of the who, what, where, when and

why questions of an accident. Using a combination of theories and models may be the optimal approach toward problem solutions.

Recommendations and Observations

Understanding the meaning of accident theories is only the foundation of accident causation. There have been complete books covering the subject to the most finite detail and I have only outline a few theories. I have included a small reference list of books for additional reading into the contents of accident causation. My beliefs into an effective safety program are similar to Dan Petersen's sub-class of System failure

An effective safety program and the occupational health and safety of employees are the combination of actions, procedures, technology, materials, tools, equipment that results from management decisions about the production processes and the organization of work. A good system will result in an organized approach to the identification, elimination, or control of workplace hazards. A bad system will guarantee occupational accidents, injuries, and diseases (not to mention low productivity and quality).

Occupational health and safety regulations try to address systems in various ways. The legal concept of "due diligence" also requires the employer to demonstrate effective safety systems and readily accept the responsibilities of protecting workers from hazards.

The actions of individual workers do play a role in accident causation. However, workplace and process design do not happen by chance! Engineers decided to design and operate a plant a certain way. Management has the authority to make choices about chemicals, technology, instruments, alarm systems, maintenance frequency and procedures, and even training. They retain the responsibility that goes with that power. Their choices can be good, or they can be bad. If good proactive safety system procedures are put in place to control hazards, accidents, injuries and illnesses will be prevented or mitigated. The whole purpose of having a safety program is to make everyone "buy-in" to the program and use it for all its benefits. The employee is a precious commodity, and is the life-blood of any corporation. If mistreated, and subject to hazardous situations and conditions, the foundation for which your corporation stands will crumble. This is the essence of success, having fruitful and productive company constituents and their willingness to go that extra mile shows how effective corporate safety programs and accident mitigation procedures are.

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INTRODUCTION

Ethics and Safety Defined

Ethics defined from a philosophical approach is the “analysis or study of concepts such as ought, should, duty, moral rules, right, wrong, obligation, responsibility and so forth”(Angeles, 1992). Normative Ethics which refers to that which is regulative of human conduct, defines ethics as “a moral philosophy that provides humanity with general guidelines about what is good and right, what people ought to do, as well as ought not to do, what should be pursued in life, how life should be lived, what we should do to others, and what others should do to us”(Angeles, 1992).

David L. Goetsch (1992), In Occupational Safety and Health, quoted Paul Taylor’s definition of ethics as, “the inquiry into the nature and grounds of morality where morality is taken to mean moral judgement, standards, and rules of conduct.” Goetsch’s definition for the purposes of his text states, “ethics is the study of morality with in the context established by cultural and professional values, social norms, and accepted standards of behavior.

Safety is defined as the practice of preventing those situations or conditions, which may be accidental, or by design, causes injury or death to humans. The way in which to put this definition into a workable application is through an intensive and comprehensive safety program. The program in place must consist of safety policies and procedures which have a commitment from both management and employees as well as rigorous enforcement of those policies and procedures if violated. Management must lead this program by their stated commitment and actions. Management’s lack of commitment, however demonstrated, will not encourage employees to join in and create the needed corporate culture to prevent the unnecessary injuries or deaths to personnel.

CORPORATE CULTURE

The definitions of ethics and safety do not appear to show any relation to each other at face value, but when put into practical application, work hand in hand to prevent the injury or death to humans. The purpose of a corporation and the legality of it’s practices are issues, which tend to widen the gap between ethics and safety. The widely accepted view of corporations is to maximize profits for the various stakeholders. Safety, when practiced in an ethical manner can cost a corporation large sums of money, which may reduce the profits distributed to the stakeholders. The corporation must perform the balancing act of safely producing a product, providing a service, and managing safety in the

workplace for its employees, while maximizing profits. If you accept the view that the purpose of a corporation is to maximize its profits, one can imagine where costs are reduced. The legality issues that arise from corporate practices create ethical dilemmas. The question between the “concepts of legal and ethical are not the same” and vary greatly. Corporate practice could very well be legal, but not ethical, but if shown illegal it will be unethical as well (Goetsch, 2002).

This dilemma of legal versus ethical must be resolved in a court of law where both sides must strike a balance. An ethical corporation will want to do the right thing if it takes a “values approach,” rather than a “compliance approach” to conducting its business and promoting a culture conducive to employee and consumer safety (Beauchamp, Bowie, 2001, pp122).

The Ethical Corporation

An important question is; what do corporations or businesses deem acceptable ethical standards for conducting business or managing their employees. This is an important question and sets the tone for a culture that promotes safety and leads the cause or one which merely talks of safety. First and foremost, a corporation should take steps to promote safety and create an ethical work culture for its employees. This can be accomplished by creating and adopting a “code of conduct,” or “code of ethics.” These codes are the very foundation, which a corporation’s working relationships with its employees, vendors, and consumers would be governed. These codes are a self-imposed means of regulation for conducting business, to be adhered too, regardless of corporate interests, self-interests, or outside pressures. The corporation should adopt and follow a code of conduct which will be provide guidance in those situations where practices are ethically ambiguous, whether from the inside or from the outside. Other benefits of following a code of conduct are minimizing the risks to consumers, workers, public, environment, and investors (Beauchamp, Bowie, 2001). Not only must the corporation act ethically, but employees also. If a corporation has made every effort from the top down to operated in an ethical and safe manner, employees must act and work in an ethical and safe manner from the bottom up. This will ensure the success of any safety program and promote the needed culture for as long as cooperation between management and labor continues.

Employee Ethics

David L. Goetsch (2002) offers guidelines for individuals to gauge their ethical behavior. These guidelines should be used for labor as well as management, but only in the case of questionable behavior believed to be illegal. An illegal

behavior needs no guideline to determine if it is ethical. The below guidelines are offered as a series of tests, which if applied to the behavior in question, would assist you in making your decision based upon your values and belief system.

The following guidelines are:

- Morning after test. “If you make this choice, how will you feel about it tomorrow morning?”
- Front-page test. “Would your choice embarrass you if a printed story of it appeared on the front page of your hometown paper?”
- Mirror test. “If you make this decision, how will you feel about yourself when you look in the mirror?”
- Role-reversal test. “If you trade places with the people affected by your decision and view the decision through their eyes, how would you feel?”
- Common-sense test. “Listen to your instincts and common sense is telling you. If it feels wrong, it probably is.”

Another test that Goetsch cited from Blanchard and Peale, *The Power of Ethical Management*, (1998) is to ask three questions of your behavior:

- Is it legal? “If it isn’t, no further consideration is necessary. If legal, is it ethical?”
- Is it balanced? “Is it fair to all?”
- How will it make me feel about myself? “If a course of action is in keeping with your own moral structure, you will feel good about yourself.”

If employees and management alike will apply these tests to the behavior in question, they will be guided in their decisions on ethical behavior and its relationship to safety.

Ethical Safety Program

A major step a corporation can take to promote a safety culture is to establish a safety program, which speaks and acts from the top down and is ethically sound. This program would have management’s commitment to worker and consumer safety and have in place, procedures which employees and consumers could use to correct unsafe conditions, unethical behavior and promote consumer safety. The program should contain as a minimum, safety rules and regulations to be

enforced, as well as an employee incentive program, when the rules and regulations are followed. Guidelines should be furnished to promote safety throughout the company and training provided to employees to create safety awareness in all departments and workstations. The safety and health professional in charge must have the authority and an open line of communications to manage the program as it is intended to operate.

Whistle Blower

Employees of a corporation, whose ethical and safety culture is questionable, can easily find themselves in a position one day of blowing the whistle. An employee being tasked with a practice, when scrutinized, is unsafe, unethical or illegal can cause an individual to feel trapped, scared, and undecided as what to do in order to gain protection. An ethical/safety program should have in place a process, which allows employees, as well as encourages employees to approach management with problems they encounter without fear of retribution. Corporate cultures which do not allow employees to come forward with issues which are questionable, create an atmosphere which breeds the whistle blower mentality. Corporations can prevent whistle blower mentality by being consistent in the application and enforcement of policies and procedures, while managing with ethical leadership. This would allow for open discussion of ethical and safety issues.

Whistle blowing is defined as the act of informing an outside authority or media of alleged illegal or unethical acts on the part of the organization or individual (Goetsch, 2002). Daryl Koehn, (2001) defines whistle blowing as, “persons who sound claims from within the very organization in which they work, aiming to spotlight neglect or abuses that threaten the public interest.” The difference between the two definitions being Koehn adding “public interest” to the equation. Koehn reasoned, that the whistle-blower felt a loyalty to the public and not to the corporation. Ronald Duska (2002) on loyalty, “felt one did not have a loyalty to a corporation because it is an object and loyalty was owed to a person and not objects.” The only bond between a corporation and its employees is money, which is not sufficient to bind people together in a business, thus loyalty should not be an issue. The corporation is in business to make a profit. The employees receive compensation to help the corporation to do so. If the corporation feels the employees are not helping or can accomplish the same with cheaper labor elsewhere, the employees are dismissed. Where is the loyalty to the employees? “The loyalty issue is one of perception. “Those who believe in loyalty to the corporation fail to take into account a relevant moral difference between persons and corporations” (Duska, 2001).

Proponents of whistle blowing refer to whistle blowers as “heroes.” Opponents of whistle blowing condemn whistle blowers as “finks.” Before an individual decides to blow the whistle on his or her employer, they should have exhausted every means of resolving the issue in question within the organization. The corporation has the responsibility to encourage open discussion of unethical, or unsafe issues in question. The person or persons bringing the complaint should feel free to discuss and provide evidence without fear of retribution from management or other employees. This method of solving questionable behavior has three benefits. First, it may result in the behavior being corrected. Second, the person or persons bringing the complaint would have thoroughly checked and verified all information and had it examined by management before going to the outside. Third, once the person or persons have gone to the outside, they as well as their information will appear to be more credible. Failing to resolve the issue within the organization will give the impression the individual is not sincerely interested in doing so, and has his or her own self-interests in mind.

The Occupational Safety and Health Administration (OSHA) under Title 29 C.F.R., Part 1910, Section 211, contain the regulations governing employee protection. It is important to know that the regulations do not offer protection to all employee groups. One should place a call to OSHA, 1-800-321-OSHA or visit their Website at WWW.OSHA.GOV to determine if their workgroup is covered under the whistle-blower protection program. The Aviation Whistle Blower Protection Program, 49 U.S.C. Section 519, also known as the Wendell H. Ford Aviation Investment and Reform Act, signed April 5, 2000. It provides protection for employees who provide information relating to any violation or alleged violation of any order, regulation, or standard of the Federal Aviation Administration. The FAA Whistle Blower Hotline can be accessed by calling 1-800-255-1111 or by visiting the FAA’s website at WWW.FAA.GOV.

CONCLUSION

It is incumbent upon corporations to create an ethical culture through the adoption of a code of ethics that establishes a philosophy of values, which employees can follow without fear of retribution. This culture can be broadened and deepened by employing ethical people and applying the ethical policies consistently and fairly throughout the organization. Employees must be assured of a fair and impartial process in place in which they can approach management with unethical, illegal, or unsafe practices with the hopes of management understanding and making the needed corrections. Corporations that operate in an unethical or illegal manner pressure their employees into whistle blowing, the last option

available to them. Once the employee has gone to the outside and attracted the media or aroused public interest, the corporation and employee is subjected to intense scrutiny that neither may recover.

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As ergonomics and human factors grow in the work area the way that the job is accomplished will become easy and more efficient. Ergonomics by definition is the study of human characteristics for the appropriate design of the living and working environment. Ergonomic researchers strive to learn about human characteristics (capabilities, limitations, motivations, and desires) so that this knowledge can be used to adapt human-made environment to the people involved. This knowledge may affect complex technical systems or work tasks, equipment, and workstations, or the tools and utensils used at work, at home, or during leisure times. This is why ergonomics is human-centered, transdisciplinary, and application-oriented.

Successful application is measured by improved productivity, efficiency, safety, and acceptance of the resultant system design. The fundamental foundation started with Leonardo da Vinci in the 16th century. His originality and ingenuity sparked the conception of ergonomics. He was far ahead of his time. He contributed many ideas, theories, and practical data to forward the understanding of the role of the human body in a work environment.

There are three levels at which ergonomic knowledge can be used:

- Tolerable- when conditions do not pose known dangers to human life or health.
- Acceptable-when conditions are those upon which (according to the current scientific knowledge and under given sociological, technological, and organizational circumstances) the people involved can voluntarily agree.
- Optimal- when conditions are so well adapted to human characteristics, capabilities, and desires that physical, mental, and social well-being is achieved.

The aim of ergonomics/human engineering is to achieve ease and efficiency at work.

Why is the video recorder one of the most frustrating domestic items to operate? Why do some car seats leave you aching after a long journey? Why do some computer workstations confer eyestrain and muscle fatigue? Such human irritations and inconveniences are not inevitable - ergonomics is an approach, which puts human needs and capabilities at the focus of designing technological systems. The aim is to ensure that humans and technology work in complete harmony, with the equipment and tasks aligned to human characteristics. Ergonomics has a wide application to everyday domestic situations, but there are even more significant implications for efficiency, productivity, safety and health in work settings. For

example, designing equipment and systems including computers, so that they are easier to use and less likely to lead to errors in operation - particularly important in high stress and safety-critical operations such as control rooms. Implementing tasks and jobs so that they are effective and take account of human requirements such as rest breaks and sensible shift patterns, as well as other factors such as internal rewards of work itself. Engineering equipment and work arrangements to improve working posture and ease the load on the body, also reducing repetitive strain injury/work related limb disorder. Information design can be constructed to reduce the difficulty of interpreting and using handbooks, signs, and displays and making them less prone to error. Design of training arrangements to cover all significant aspects of the job that will be performed and to take account of human learning requirements.

The design of military and space equipment and systems are an extreme case of physical demands on human beings. Designing working environments, including lighting and heating, to suit the needs of the users and the tasks performed. Design of personal protective equipment for work and hostile environments. In developing countries, the acceptability and effectiveness of even fairly basic technology can be significantly enhanced. The multi-disciplinary nature of ergonomics (sometimes called 'Human Factors') is immediately obvious. The ergonomists work in teams, which may involve a variety of other professions: design engineers, production engineers, industrial designers, computer specialists, industrial physicians, health and safety practitioners, and specialists in human resources. The overall aim is to ensure that our knowledge of human characteristics is brought to bear on practical problems of people at work and in leisure. We know that, in many cases, humans can adapt to unsuitable conditions, but such adaptation leads often to inefficiency, errors, and unacceptable stress. Ergonomics deals with the interaction of technological and work situations with the human being. The basic human sciences involved are *anatomy*, *physiology* and *psychology*, these sciences are applied by the ergonomist towards two main objectives: the most productive use of human capabilities, and the maintenance of human health and well-being. In a phrase, the job must 'fit the person' in all respects, and the work situation should not compromise human capabilities and limitations. The concept of basic *anatomy* is used for improving physical 'fit' between people and the things they use, ranging from hand tools to office space design. Achieving good physical fit is not an easy feat when one considers the range in human body sizes across the United States of America. The science of anthropometrics provides data on dimensions of the human body, in various postures. Biomechanics considers the operation of the muscles and

limbs, and ensures that working postures are beneficial, and that excessive forces are avoided.

Our knowledge of human *physiology* supports two main technical areas. Work physiology addresses the energy requirements of the body and sets standards for acceptable physical workrate and workload, and for nutrition requirements. Environmental physiology analyses the impact of physical working conditions - thermal, noise and vibration, and lighting - and sets the optimum requirements for these.

Psychology is concerned with human information processing and decision-making capabilities. In simple terms, this can be seen as aiding the cognitive 'fit' between people and the things they use. Relevant topics are sensory processes, perception, long- and short-term memory, decision making and action. There is also a strong thread of organizational psychology.

The importance of psychological dimensions of ergonomics should not be underestimated in today's 'high-tech' world - remember the video recorder example at the beginning. The ergonomist advises on the design of interfaces between people and computers (Human Computer Interaction or HCI), information displays for industrial processes, the planning of training materials, and the design of human tasks and jobs. The concept of 'information overload' is familiar in many current jobs. Paradoxically, increasing automation, while dispensing with human involvement in routine operations, frequently increases the mental demands in terms of monitoring, supervision and maintenance.

Underlying all ergonomics work is careful analysis of human activity. The ergonomist must understand all of the demands being made on the person, and the likely effects of any changes to these - the techniques which enable him to do this come under the portmanteau label of 'job and task analysis'.

The second key ingredient is to understand the users. For example, 'consumer ergonomics' covers applications to the wider contexts of the home and leisure. In these non-work situations the need to allow for human variability is at its greatest - the people involved have a very wide range of capabilities and limitations (including the disabled and elderly), and seldom have any selection or training for the tasks which face them.

This commitment to 'human-centered design' is an essential 'humanizing' influence on contemporary rapid developments in technology, in contexts ranging from the domestic to all types of industry.

Human Factors has its origins in the Industrial Revolution and emerged as a full-fledged discipline during World War II.

It was recognized that aircraft cockpit design needed to consider the human interface for controls and displays. Design Engineers were focused on the technology while Industrial Psychologists worked to optimize the interface. In some cases, Human Factors design can affect bottom-line profitability or can be a life and death matter, e.g., you don't want to push the wrong button or mistake meters for kilometers in a spacecraft. Companies came to realize that a product's success is dependent upon good Human Factors design.

Human Factors is often used interchangeably with User Interface Design or Human-Computer Interface. There is a lot of overlap in these disciplines; however, Human Factors generally refers to hardware design while HCI generally refers to software design. Engineering Psychologists work in both disciplines and the overlap is considered greater than the difference.

Optimum Human Factors Design requires a systematic approach to the design process. But, to ensure optimum performance, Usability Testing is required. This empirical testing permits naïve users to provide data about what does work as anticipated and what does not work. Only after the resulting repairs are made can a product be deemed to have a user optimized design.

Today all large corporate and military manufacturers team design engineers with Engineering Psychologists to ensure optimum usability. Some of the prime industries relying on Human Factors for design consideration are: High Tech, aircraft, automobile, military, consumer products, and many other companies wanting an edge in the marketplace.

The cause and prevention of musculoskeletal disorders in industrial environments requires multidisciplinary cooperation and involve a much wider range of variables than office environments. For example, environment issues like cold, vibration, and protective clothing are typically not a concern in office environments. The range of tasks in industrial environments is almost indescribable. Just think -- every object you encounter during your day was manufactured somewhere and most had some human involvement. In addition, there are all the maintenance people keeping the facility, machinery, workstations in good working order. Others are stocking parts while others are generating shipping labels and loading trucks. Entire departments are dedicated to rework and repair. There are product testers and inspectors, laboratory workers, and forklift drivers. Some stand on ladders while others lay on their backs, stand at a workstation, or sit at a desk. Different types of assembly processes have different risks for musculoskeletal disorders. Progressive assembly versus

non-progressive assembly, machine paced versus self paced, piece part versus hourly pay -- all have unique concerns relative to musculoskeletal illnesses and injuries.

Material handling and product positioning are two of the key areas of concern because of the force requirements. Force, coupled with awkward posture and repetition is a recipe for the development of musculoskeletal disorders. Some folks work on items so small that all work is done with the aid of a high powered microscope while others are installing large tires on dirt moving equipment. You have the Swiss watch and pacemaker assemblers, the circuit board repair folks, the people that wire up communications switching units, and the auto chassis assemblers. Each of these examples has their own risks for work related musculoskeletal disorders. I look forward to input from all walks of industrial life

Ergonomics developed into a recognized field during the Second World War, when for the first time, technology and the human sciences were systematically applied in a co-ordinate manner. Physiologists, psychologists, anthropologists, medical doctors, work scientists and engineers, together addressed the problems arising from the operation of complex military equipment. The results of this interdisciplinary approach appeared so promising that the co-operation was pursued after the war, in industry. Interest in the new approach grew rapidly, especially in Europe and the United States, leading to the foundation in the UK of the first ever national ergonomics society in 1949, which is when the term ergonomics' was adopted. This was followed in 1961 by the creation of the International Ergonomics Association (IEA), which at present represents ergonomics societies which are active in over 40 countries or regions, with a total membership of over 15 000 people. In the United States, the term 'human factors engineering' is often used. A sufficient definition would be that ergonomics aims to design appliances, technical systems and tasks in such a way as to improve human safety, health, comfort and performance.

In the design of work and everyday-life situations, the focus of ergonomics is man. Unsafe, unhealthy, uncomfortable or inefficient situations at work or in everyday life are avoided by taking into account of the physical and psychological capabilities and limitations of humans. A large number of factors play a role in ergonomics; these include body posture and movement (sitting, standing, lifting, pulling and pushing), environmental factors (noise, vibration, illumination, climate, chemical substances), information and operation (information gained visually or through other senses, controls,

relationships between display and control), as well as tasks and jobs (appropriate tasks, interesting jobs). These factors determine to a large extent safety, health, comfort and efficient performance at work and in everyday life. Ergonomics draws its knowledge from various fields in the human sciences and technology, including anthropometrics, biomechanics, physiology, psychology, toxicology, mechanical engineering, industrial design, information technology and industrial management. It has gathered, selected and integrated relevant knowledge from these fields. In applying this knowledge, specific methods and techniques are used. Ergonomics differs from other fields by its interdisciplinary approach and applied nature. The interdisciplinary character of the ergonomic approach means that it relates to many different human facets. As a consequence of its applied nature, the ergonomic approach results in the adaptation of the workplace or environment to fit people, rather than the other way around.

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INTRODUCTION

Success or failure in the Aviation Industry rests with its safety record. In order to maintain a desirable safety record management must ensure that all aspects of the entire operation are being followed in accordance with applicable standards regulations, local policies and practices. Both Occupational Safety and Health Administration (OSHA) and Federal Aviation Administration (FAA) published those regulations and standards the industry follows. The U.S. Air Force develops their own regulations and obey OSHA standards where needed in order to maintain a safe environment. To assist compliance each agency developed a Self Inspection Programs, management should implement these voluntary self-inspection checklist-allowing deficiencies to surface and ensuring that there is no conflicting standards between agencies. After all the objective of implementing self-audit programs is to maintain a safer and healthful working environment while being in compliance with a standard.

RELEVANT LITERATURE

Prior to 1970 sporadic and vague laws ruled work place safety until congress passed the Occupational Safety and Health Act creating Occupational Safety and Health Administration (OSHA). The new agency task is to insure assure every working person a safe and health full working conditions by providing safety and health standards "...conducts inspections, investigates problems, issues citations, assesses penalties, petitions the courts to take appropriate action against unsafe employers provides safety training..." (Goetsch,2002,pg13). OSHA was established under the US Department of Labor along with a section in title 29 of the Code of Federal Regulations Part 1900 – 1910 that contains uniform laws needed to help reduce work-related injuries, illnesses and deaths. In order to maintain a safe aviation maintenance program in the civilian aviation industry, two aspects of compliance must be taken under consideration OSHA and the Federal Aviation Administration. OSHA regulations cover industrial and employee safety issues such as worker protective equipment, industrial hygiene, chemical and toxic exposure, shop standards and man-lifts just to name a few. In addition it provides other services regarding the aircraft industry for example, air quality monitoring, airport fire-fighting and protective equipment training and in addition educating the work-force on its regulations.

On the other hand the Federal Aviation Administration (FAA) regulations assures the aviation industry is in compliance, and consequently promoting safety. Nevertheless conflicting disagreement between two governmental agencies

regulation became apparent. Both recognized the need to make certain that one agency does not block the other agency's regulations, to resolve the disagreements between the two on July 10, 1975; FAA published a Federal Register Notice under the Memorandum of Understanding between FAA and OSHA. Declaring the FAA with total responsibility for the safety of civil aircraft operation. The agency will issue and enforce ... "standards and regulations affecting occupational safety or health with respect to U.S. registered civil aircraft in operation" (M.O.U.II.B, 2000,pg.1). However, both parties agreed that more clarification was needed pertain to which set of standards to follow when employees were on an aircraft while in operation, or when it was parked. One concept was certain; the FAA defined an aircraft to be in operation when is boarded by a crewmember prior to flight, and until last crewmember departs the aircraft. But in case of aircraft mechanics and other ground crews murky standards still-hunted them, for instance OSHA requirement 29U.S.C, 653(b) (1) better known as Section 4(b) (1) is interpreted to say " nothing in these standards covers employee conditions that are under another Federal Agency.

It was obvious that it was un-clear for all aviation employees other than flight crews. This lead OSHA and FAA to resolve this controversial issue within 120 days. The results introduced a second version of the Memorandum Of Understanding, published in the 1975 Federal Register Notice with a new policy statement "OSHA still apply to the working conditions of employees on aircraft in operation (other than flight deck crew)". (M.O.U. III.1. 2000, pg.2). In other words, the purpose of this M.O.U is to improve safety and health in the aviation industry and to abolish and conflicting

disagreement between FAA and OSHA while the flight crew is not on-board. The revised M.O.U clarifies that the Federal Aviation Administration "exercises statutory authority pursuant to 49 U.S.C. 44701 et seq., governing aviation safety and may issue regulations that are related to flight safety" on the other hand OSHA "exercises statutory authority pursuant to 29 USC s 651 et seq., governing the occupational safety and health of employees" M.O. U.II.A 2000, pg.1.). Therefore aviation companies here in the U.S must follow both OSHA and FAA regulations where it is appropriate.

For example an aviation repair facility is governed by FAR sec 145.103 Housing and Facilities Requirements. The facility equipment, materials, shops, machinery and the facility itself must be in-compliance with this general regulation. But OSHA takes it a step further regarding industrial machinery and equipment, section 29 CFR 1910.212 General Requirements for all machines, it specifies in more detail the anchoring of machinery as well as pre-cautions and specific types

of machine guards. This is a good example how one government agency takes over from where the other terminates. The prevailing agency is more specialized in that particular area and consequently the end result is a safer working environment, for the same reason the U.S. Air Force writes and adopts a wide variety of OSHA standards.

The Headquarter Air Force Safety Center (H.Q.A.F.S.C) copies and revises OSHA's standards under the title of U.S. Air Force Occupational Safety and Health (A.F.O.S.H) standards. In most AFOSH standards like 91-100 Aircraft Flight Line and Ground Operations Activities states "This standard implements regulatory provisions of several Occupational Safety and Health Administration (OSHA) Standards and also Air Force criteria not addressed in the OSHA Standards" (AFOSH 91-100,1998,pg.1.).

Again here we could see in the aviation industry how two agencies are calling the shots when it comes to aviation. To help de-fuse the power struggle, the Air National Guard Instruction 21-101 calls out that "conflicts between administrative and technical publications will be resolved in favor of the technical publication" Furthermore it goes on to say "conflicts between procedural technical publications and weapon system specific technical publications will be resolved in favor of the weapon system specific technical publication" (A.N.G.I 21-101,2002,pg.14-15.).

Meaning if there is a controversy, the specific standard will dominate. I would like to mirror a previous example of in-shop machinery between FAA and OSHA. Knowing that OSHA standards are more detail orientated when it comes to in-shop machinery, AFOSH says "machinery that equipment do not have guards as part of their design, suitable enclosures or barricades shall be installed to prevent possible injury O.S.H.A. 1910.212" (AFOSH.91-100.1998, pg.47.). Here the Air Force standard refers the aircraft maintainer to seek OSHA for more guidance because of it specifics in "machine guarding shall be provided to protect the operator and others from hazards... guards shall be affixed to the machine where possible and secure else where if for any reason attachment to the machine is not possible. Guard shall be such that it does not offer an accident hazard in itself" (OSHA 1910. 212 (a) (2). 2003, pg. 1). The Department of Labor is being more detail orientated than Air Force in this case.

The opposite is true, regarding fall protection while performing aircraft maintenance or inspections especially on top of an aircraft wing. AF 91-100 gives local authority on the number of people that could anchor to a horizontal lifelines "local procedures will be developed and used to ensure the number of personnel attached to the lifeline at any one time

will not exceed the anchorage point design limits” (AFOSH 91-100, 1998, pg. 48). OSHA states “Horizontal lifelines where used, shall be designed and installed as part of a complete personal fall arrest system which maintains a safety factor of at least two, under the supervision of a qualified person” (OSHA 1910.66, 2003, pg. 4). In the previous example, the AFOSH prevails, giving the local hangar chief authority on the amount of personnel that could be on top of an aircraft at any one time with no supervision. Also it allows a local directed policy letter to specify in more detail the intention of the Air Force standard. In either case the responsibility for compliance resides with the individual and supervisor.

However enforcement of compliance is needed in any industry and one way to accomplish this is by the means of evaluations programs.

Management must ensure through evaluation programs that all aspects of maintenance procedures are being conducted in accordance with all applicable standards, policies, technical order and manuals. Being in compliance simultaneous with all government agencies and staying within the parameters management can utilize several tools. One of them is the usage of several departmental agencies within their structure of the company. These departments may include flight operations, flight safety, ground safety, quality assurance and airline safety. Part of their job is to conduct a broader inspection within the company and also make certain that all operations have internal compliance and auditing programs in place. The self-inspection checklist program should be used as a common standard approach to every work standards by immediate supervisor. Furthermore, auditing done by independent departmental agencies within company resulting in compliance or not in compliance should be communicated across all departments. One way to avoid repeated negative results from auditing within company is that management may select a voluntary self-checklist offered by all three agencies.

The FAA developed voluntary information as part of a self-checklist called Best Practices. It provides information relating to internal quality audit program, scrap aircraft parts and material, statistical and quality control best practice. The FAA encourages Best Practices to increase awareness and promote compliance with Federal Aviation Regulations. The end result is to be in compliance, promote safety and also to encourage companies to design a program within that parallel BP. OSHA also mirrors FAA “Best Practice’s” with its own program to encourage safety.

The Voluntary Protection Program (VPP) assist firms to not only to meet standards requirements but also to

improve morale, identifies areas such as effective contractor safety management and emergency response procedures. The program is effective in the realm of aviation maintenance because it evaluates employer safety and health policies and procedures, resulting in management commitment and employee participation. With personnel involvement, a worksite analysis and a hazard prevention and control evaluation accomplished in areas such as ground support equipment, engine shop, component repair section and flight line maintenance as a result a hazard reporting system and a safety and health performance plan can be developed and implemented similar to(VPP) . Delta Airlines executed (VPP) in April 2000. The plan documented and tracked identified hazards resulting in the enforcement of a safer work environment by implementing policies and procedures for each job, resulting in a reduction of workplace injuries. After Delta implemented the VPP and corrected its weak points, OSHA granted the operating units VPP Merit status in January 2001, making “Delta the first major commercial airline to apply for and receive this distinguished recognition” (Lamberton, 2002, pg. 2). Similar to both the VPP and FAA’s Best Practices is the Air Force’s Compliance And Standardization Requirement List (C&SRL).

The checklist is composed of numerous of self- assessment items from the shop level to the maintenance commander. The objective of the C&SRL is the same as the Best Practices and OSHA’s VPP to promote a safer work place and at the same time be in-compliance with Air Force regulations. Each individual C&RSL is composed of individual steps. Each step calls out the specifics of how a particular area should be within regulations and references the regulation that covers that step. For example, C&SRL 2108 Maintenance Squadron under Accessory Maintenance Element step 4.13 “has a confined space entry program been established? (ANGI 21-101 para 6.6.4.5.,T.O 1-1-3, AFOSH Standard 48-1” (C&RSL. 2108.1998,pg. 3.) In this particular step it gives the shop chief three specific guidelines on how to be in-compliance. It is a tool to detect negative trends and problem areas and is also designed to be a feedback system for maintenance leaders, supervisors and workers.

The end result of these governmental agencies is to have a good comprehensive program that encourages safety and promotes healthful work environment for all employees.

CONCLUSION

When an industry is ruled simultaneously by different agencies, the chances of their standards conflicting is very

realistic. In order to maintain a desirable safety record in the Aviation Industry, management must be aware of these disagreements and ensuring that all aspects of the entire operation follow the applicable standards, regulations, and policies. Even though OSHA, FAA and the US Air Force enforce these standards each agency also encourages their Voluntary Self-Inspection Programs throughout the industry. The implementation of these programs may revealed differences between standards and allows each department to do self-audit without any repercussion. Besides detecting any unknown deficiencies the program improves compliance resulting in a safer working condition for all in the industry. Nevertheless, one thing is certain standards, regulations, policies and military instructions are only as good as those who follow it.

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Organizational Culture and Safety

The beginning of the organizational culture period of accident investigation and analysis can be traced back to the nuclear accident at Chernobyl in 1986 (Cox & Flin, 1998). On April 26 1986, two explosions blew off the 1000-ton concrete cap sealing the Chernobyl-4 reactor, releasing molten core remains into the vicinity and fission products into the atmosphere. It was the worst accident in the history of nuclear power generation. It has so far cost over 30 lives, contaminated approximately 400 square miles around the Ukrainian plant and significantly increased the risk of cancer deaths over a wide area of Scandinavia and Western Europe (Read, 1990). Poor safety culture was identified as a contributing factor in the Chernobyl disaster (Cox & Flin, 1998). Since then safety culture has been discussed in other major accident enquiries and analysis of system failures, such as the King's Cross Underground fire in London and the Piper Alpha oil platform explosion in the North Sea (Cox & Flin, 1998; Pidgeon, 1998). According to Meshkati (1997), the most dramatic turning point for "safety culture" in the United States came with an aviation accident that killed 14 people -the in-flight structural breakup and crash of Continental Express Flight 2574 near Eagle Lakes, Texas, on September 11, 1991. As a member of the National Transportation Safety Board (NTSB) at that time, Dr. John Lauber suggested that the probable cause of this accident included "The failure of Continental Express management to establish a corporate culture which encouraged and enforced adherence to approved maintenance and quality assurance procedures" (Meshkati, 1997). As a result of this and other similar aviation accidents, safety culture came to the forefront as the exclusive topic at the U.S. National Summit on Transportation Safety, hosted by the NTSB in 1997.

The acknowledgment of the meaning of safety culture in preventing accidents has led to many studies attempting to characterize safety culture in a number of high-risk manufacturing companies. Cox and Flin state, there have been few attempts to examine the various definitions of safety culture that have been proposed in the literature, nor have there been any attempts to culture within organizations. Furthermore, such terms as "safety climate" are often used in conjunction with safety culture, with little if any differentiation between the concepts (Cox & Flin, 1998). Consequently, while the concept of safety culture continues to attract more attention, "the existing empirical efforts to study safety culture and its relationship to organizational outcomes have remained unsystematic, fragmented and in particular under-specified in theoretical terms" (Pidgeon, 1998).

The first thing to recognize about Safety Culture is that it cannot be quantitatively measured. Instead, it is more appropriate to survey attitudes, and observe employee and management behaviors, and the quality of the work process. The rapid development of new technology has fundamentally changed the nature of work and has increased the complexity of systems within a variety of industries (Hendrick, 1991). Among these complex systems are those commonly known as "high-risk" systems, such as nuclear power plants, chemical processing facilities, and aviation operations that require a tight coupling between both technical and human subsystems. It is critical to have positive workplace attitude – from the president to the newest hire.

Management is the key to a successful safety culture. This positive attitude must flow from the top down. How many times have you heard the expression "flavor of the month" directed at a new organizational program or process? It's common for corporations to adopt this lack-luster attitude and it is one of the largest mistakes made. Deliberate how safety programs are conventionally presented to would-be participants. A corporate administrator learns about a new safety program and orders the appropriate materials. Some companies go as far as to hire a trainer to teach the new step-by-step procedures to certain personnel. Then these employees demonstrate the new procedures to others while on the job, and thus a new safety program is implemented plant wide. But to many this is just another set of temporary procedures, which attempt to reduce recordable injuries and make management look good. It is commonly believed that the new program won't really work to reduce injuries, and therefore it won't be long before it will be replaced with another "flavor of the month." The "flavor-of-the-month" attitude occurs when people are not taught the principles or rationale behind a program. They are just trained on how to implement the new process. They are not educated about the research-supported theory and corporate mission statement from which the program originated. A true safety culture is established when safety is valued consistent with productivity and profitability. Managers and supervisors need to be held accountable for safety in the same manner as production and profitability.

Paul O'Neill, U.S. Secretary of the Treasury, as printed in the Industrial Safety and Hygiene News (ISHN), March 2001, explains: "Many companies still see safety management as a costly legal requirement with no real business benefits, but this is not the case. He explains that all truly great organization must be aligned around values that bind the

organization together." "This is how companies withstand competitive pressures and operate consistently on a far flung global basis." He stated that: great organizations have three characteristics:

- Employees are treated with dignity and respect.
- They are encouraged to make contributions that give meaning to their lives.
- Those contributions are recognized.

According to O'Neill: "Safety is a tangible way to show that human beings really matter." He continues to state that:

"Leadership uses safety to make human connections across the organization. Stamping out accidents (which at Alcoa O'Neill called "incidents"), and telling employees we can get to zero incidents is a way to show caring about people. This is leadership." Leadership accepts no excuses, and does not excuse itself, when safety problems arise.

- Simply caring about safety is "not nearly enough, not nearly enough," He continues to say: "At the end of the day, caring alone is not enough to make sure that an incident never happens again."
- What's needed is for "safety to be as auto-matic as breathing," "It has to be something unconscious almost."
- This won't happen by leadership simply giving orders. "You need a process in place to get results." A process based on leadership, commitment, understanding, and no excuses.
- "Safety is not a priority at Alcoa, it is a precondition. If a hazard needs to be fixed, it's understood by supervisors and employees that "you do it today. You don't budget for it next year."

He continues by stating: How do you get an organization to believe this? "You always must be constantly thinking about ways of refreshing the organization's thinking about safety."

O'Neill outline five steps he took soon after coming to Alcoa. He called in the safety director to review the company's performance. O'Neill was told Alcoa's rates were below industry average. "That's good," "But the goal is for no Alcoa to be hurt at work," he told his safety director. No injuries down to first aid cases. "The only legitimate goal is

zero." Otherwise, who's going to volunteer to be that one annual case, or whatever? Getting to zero is a journey of discovery, O'Neill said, and at no point can you stop and say, "We've reached the point of diminishing returns and can't afford to get better."

O'Neill met with employees and gave them his home phone number. "I told them to call me if their managers didn't fix safety problems. What I was doing was making a point to my managers."

O'Neill had 26 business units. Vice presidents call him personally whenever their group experienced a lost workday case. "This constantly engaged them about safety," he said. It forced them to confront themselves: "Why do I have to make this call I hate to make?"

When Alcoa launched an internal computer network, safety information came online first, before marketing, sales or finance, according to O'Neill. Just another way to keep safety in front of employees and managers and reinforce that it is a pre-condition, he explained.

O'Neill told his financial people, "If you ever try to calculate how much money we save in safety, you're fired." Why? He didn't want employees looking at safety as a "management scheme" to save money. "Safety needs to be about a human value. Cost savings suggest something else. Safety is not about money; it's about constantly reinforcing its value as a pre-condition."

OSHA strongly believes that an effective safety and health program is the answer and results are the proof. After focusing on its safety and health program, an Atlanta company reported that, from 1994 to 1996, their annual Workers' Compensation claim costs fell from \$592,355 to \$91,536, a savings of \$500,000. After implementing a 100% fall protection program and supervisory accountability for safety, Horizon Steel Erectors, Inc., had a 96% reduction in its accident costs per person per hour, from \$4.26 to \$0.18 (Mallon, 2001).

To go along with the "flavor of the month syndrome", a lot of companies cannot release the Blood Priority or otherwise known as the Tombstone Safety Program. Mr. Richard Wood, author of "Aviation Safety Programs," states that Tombstone Safety refers to the idea that it's a lot easier to get something corrected if you just had an accident or killed someone - there is literally blood on the accident report." The result to this is that it is difficult to get something corrected if it has not caused an accident. This is the, "If it ain't broke, don't fix" attitude. This type of attitude is taught, and it

comes from the top down. If the corporation has the Tombstone Safety Program, then that's what the employee's will do...Tombstone Safety!

Team Building and Safety Culture

Building a safety culture is not a safety function, but a project management function. And no one person can do it alone. Kenneth Blanchard, author of the "One Minute Manager Builds High Performing Teams," states, "Not one of us is as smart as all of us put together." Empower the employee's and getting them involved is exactly Paul O'Neill done at Alcoa. He built a high performing team that was focused on safety culture. To do this one must be totally involved and empower the workforce.

However you manage your other projects, you need to build a safety culture in a particular way. Consider the AT-TAM approach: Assess, Train, Teach, Assign, and Monitor.

Assess. Observe people working, and take notes. What are the recurring unsafe acts? Record each unsafe act as it occurs. Once employees notice you in an area, they put on a face of safety and limit your ability to observe. That's the time to ask, "Why are these unsafe acts occurring?"

Assess your people to determine who can champion the correcting of attitudes, behavior, and ignorance. Who are the key players? Usually, they are crew leaders, supervisors, and others with authority. Identify the people, and then identify their attitudes and basic safety knowledge.

Train. Once you've selected your safety champions, you must do more than just tell them, "Now I am making safety part of your performance evaluation." They must learn the causes of injury and alternatives to practicing those causes. You must train everyone that safety is equal to or greater than all other goals, including production. Safety champions are teachers, but they are only as effective as their training and the backing of management allow them to be. Consider purchasing "train the trainer" safety programs.

Teach. Your trained safety champions teach safety to the rest. The simple teaching method has three parts. First, stop

when you enter an area. Scan the area, then look, listen, smell, and feel for unsafe conditions. Look for such things as improper tool use. Listen for high ambient noise. Smell for gasoline fumes. Feel for high heat.

When you notice an unsafe act, approach the worker, making him or her aware of the unsafe practice. Then you must follow up to ensure that worker corrects it. You also teach by looking for safe acts. For example, if you see an employee-working overhead and wearing a safety belt, let that person know you recognize and appreciate his or her attention to safety.

Assign. Some unsafe acts wouldn't happen if you could correct environmental problems. For this, you must hold individuals responsible. If it's nobody's job, nobody will do it. Make specific work assignments and hold individuals accountable for certain safety objectives.

- Assign individuals to inspect equipment and work areas for problems such as poor lighting, missing guards, damaged equipment.
- Assign ownership of an individual problem to an individual (who may lead a group in resolving it).
- Assign individual safety ownership of specific power distribution equipment, so such activities as breaker testing and transformer inspection actually happen.
- Assign someone to audit inspections, safety tours, safety meetings, and other activities.

Monitor. Check your safety culture progress by asking key questions. How are employees responding? How are your teachers carrying out their duties? Do they need more training? What are the recurring types of unsafe behavior? When did you last observe people working? Are safety inspection reports precipitating action? Is it easy to report unsafe conditions or equipment? Are you replacing unsafe equipment? Are you rewarding your employees for safe or unsafe acts?

Everything boils down to two questions: Do your employees know how much you value safe behavior? Are you sure you want them to know?

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Procedure Non-Compliance

Have you ever not worn safety goggles while weed eating your yard? Maybe, but probably not if you are the least bit safety conscious and care for your sight. Well, what if you got home late from work, the sun is going down, and your kid used your safety goggles as a play toy, destroying them. Would you go to the store to get new goggles possibly having to put weed eating off till tomorrow or would you weed eat your yard without your safety goggles? Now be truthful! You know you have done it. We all have at one time or another. It might not have been weed eating, but it was something that was no very safe, to ourselves or someone else around us. In a word this was procedure non-compliance. Yes, I said procedure.

Did you actually read the procedures/instructions that came with the weed eater, or whatever? If you are a man then the answer is usually a big, fat NO. Well next time, before you pick up your weed eater, read the warning label in the instruction manual, if you didn't through it away. I bet that the warning label says something to the fact of:

• IMPORTANT SAFETY INFORMATION •

READ ALL INSTRUCTIONS BEFORE OPERATING

- **WEAR EYE AND HEARING PROTECTION WARNING:**
Thrown objects and loud noise can cause severe eye injury and hearing loss. Wear eye protection meeting ANSI Z87.1-1989 standards and ear protection when operating this unit.
- Wear heavy, long pants, boots and gloves. Do not wear loose clothing, jewelry, short pants, sandals or go barefoot. Secure hair above shoulder level.

So did you read it? Yeah right! You, no safety goggle, short pants, barefoot'n weed whacker you. And if you do these kinds of things at home, what do you do at work? Do you take short cuts or do you follow procedures to the letter, regardless of peer pressure or management pressure? I can almost guarantee that sometime in your illustrious career you

cut corners. Oh sure, there are a thousand reasons why you did it and you may have gotten away unharmed so far, but what will tomorrow bring? A minor burn or cut, a broken arm, a trip to the hospital, or the ultimate sacrifice – you and/or a co-worker pushing up daisies.



Procedures are put in place for a reason, usually because someone already tried it the wrong way and paid the price, but procedures are also put into place by the designers and engineers (the 10 lb. brains) because they know the science that tells them the limitations of the machine and the human body. Hundreds of thousands or even millions of dollars can go into the research and development phase of a machine's design and a part of that money is spent on writing the proper procedures on how to operate the machine. So what makes you think you know better than these 10 lb. brains?

Well, studies have shown that an individual's or crew's non-compliance with procedures can fall into one of three categories: a lack of procedural knowledge, a lack of procedural skill, or an inability to recognize the conditions requiring the procedure. (Mancuso, 1997) Both a lack of procedural knowledge and skill are testable and most of the time can be fixed with additional training and evaluation. An inability to recognize the need for a certain procedure is also somewhat testable with today's technology, but it is still an illusive animal. Boeing safety engineers have analyzed 10 years of commercial aircraft hull loss accidents and have determined that flight-crew compliance with established procedures is the single most effective safety prevention strategy available to airlines, according to Mike M. Moodi, a senior human factors specialist at Boeing Commercial Airplane Group. (Proctor, 1998) Well that's just great! Now we all know that procedural non-compliance is a major factor in aircraft accidents, but what do we do with this information? Why are these pilots not complying with procedures? Well you know what, I would like to add one more category to the reasons why people don't comply with procedures and that is the "just get it done" attitude.

This type of attitude can be very dangerous to an organization and more importantly; it can be very near impossible to predict, although it can be controlled, more on that later. This attitude can infect everyone, from upper management to the mailroom. I am not saying that a lean forward, hard charging attitude is wrong. No. That's not what I am saying at all. To the contrary, these people can push a company to achieve great things. What I am saying is that the just getting it done at all costs attitude, even to the point of disregarding safety and procedures, is careless and may one day get you or

someone you know killed. For example, let's say an aircraft maintenance supervisor needed to get an airplane towed across the ramp to the maintenance hanger in order for it to be fixed before the next morning. This maintenance needed to be happening so that the plane could fly its mission and the supervisor was the only one available to tow the airplane. The supervisor, knowing that the boss didn't like excuses and the supervisor having a just get it done attitude decided to tow the plane by himself. He had vast experience in towing aircraft and thought, "what could go wrong." The question is, if nothing went wrong and the supervisor got the plane to the hanger with plenty of time to spare, was he wrong in disregarding procedures? Well, let me give you some statistics and some photographs of people who didn't follow procedures or rules and ended up paying a hefty price and then you can make up your own mind.

Everyone knows that seatbelts save lives and the law requires their use. In a crash, seatbelts help distribute the impact forces over larger and stronger parts of the person's body, such as the chest, hips and shoulders. The safety belt stretches slightly to slow your body down and to increase its stopping distance. (NHTSA, 1992) Every year thousands of



Sudden Impact, National Safety Council, 1992,
www.nsc.org

motorist's lives are saved because they obeyed the law and wore their seatbelt. So why do some people still refuse to wear their seatbelt. Is it hard to put it on? Does it make them look un-cool? Are they worried that they may not be able to free themselves from the seatbelt if they have an accident? What about this picture to the left, whatever the reason the two people in the car had for not wearing their seatbelts, I don't think it was good enough. If they had complied with state law by wearing their seatbelt, they would have probably walked away from this accident unharmed. Still not convinced that following procedures is good for you?

Well how about something that kills thousands and thousands of Americans every year, alcohol related accidents. Over and over, on the TV, radio and newspaper we hear about how drinking and operating a motor vehicle killed another person. We also know that this is against the law, but yet every day thousands of people decide to risk their and maybe someone else's life by drinking and driving. This picture below is the result of two people deciding to break the rules and drive while intoxicated. The coroner determined that the two driver's blood alcohol levels were both above 0.22, twice the

legal limit. The National Transportation Safety Board determines that the probable cause of the collision between the Advantage and Bayliner recreational vessels was alcohol impairment, which led the two boat operators to indulge in high speed operations at night, and which impaired their ability to determine the movements of other vessels and to take appropriate action to avoid a collision. (NTSB, 1999) Five people lost their lives that day all because they chose not to obey the rules. I don't know about you, but I convinced myself that procedures are good and are put into place to protect use.

The following chart shows some reasons why people, in a large United States organization, failed to follow procedures. The numbers indicate how many people, per reason, had an accident during a fiscal year. As you can see there are many reasons for people not to comply with procedures. So what do we do about it? If we are talking about an individual

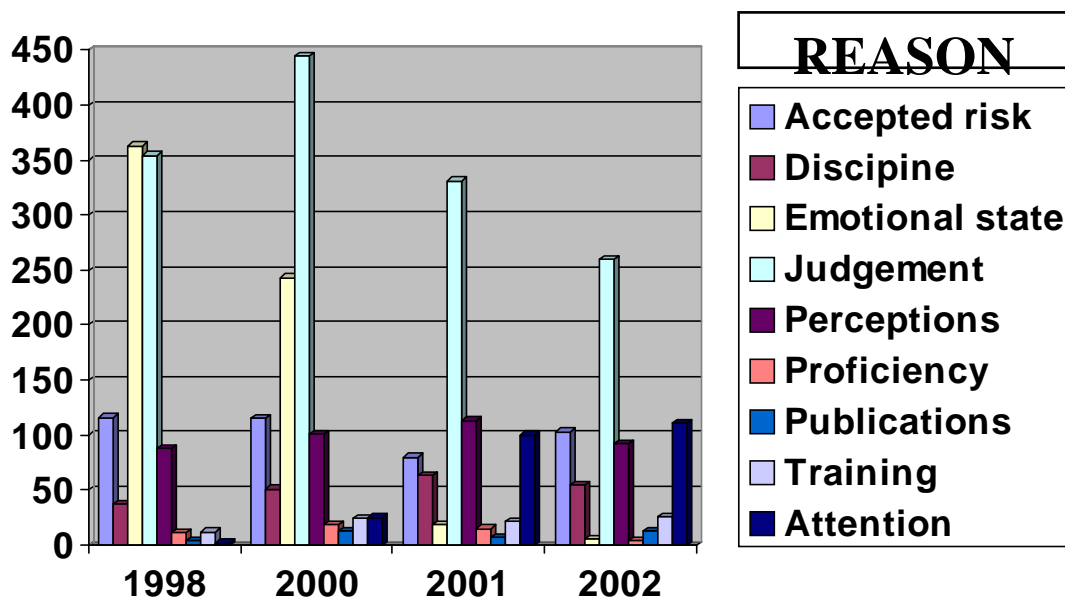
then there is not much that anyone can do. It is up to the individuals to police themselves, although family pressure from there loved ones to stay healthy are strong motivators. Trust me, I know!

But if we are talking

about members in an organiza-

tion then there is one major player that makes people comply with the organization's procedures – punishment! Yes, that thing a lot of upper management claims they will enforce, but more times than not, they don't. Punishment is a great motivator and it makes most people think twice before they do something stupid. This is true whether or not we are talking about; possibly losing your job for destroying equipment because you took a short cut, possibly dying if you risk your life at the graceful art of bungee jumping, or possibly going to jail if you get arrested for breaking and entering. Ok, I guess that last example isn't a good one. Three-square meals a day, cable TV and a free college education are not much of a punishment.

But punishment, one that is backed up by action, in an organization is a great motivator to getting workers to



comply with procedures. Think about it for a moment. If you saw your office mate or a friend that you work with get fired for not following procedures or get seriously injured for not wearing safety equipment. Wouldn't you think twice, maybe three times before you took a short cut because you were trying to impress the boss or didn't wear your safety goggles because you were in a rush? Management is also on the bandwagon, wanting workers to comply with procedures even if it takes more time, because times have changed and costs have changed.

Now days, if someone is fired or unable to work, it cost more in retraining, an inexperienced workforce, workers compensation and lost production than it ever would have if the worker just followed procedures.

So what am I saying? I am saying that rules are good. Procedures are developed in order to protect us, so that we remain a healthy, viable member in society and in the work force. A lot of times procedures came about because someone had an accident and paid a price, so why would you feel that you need to pay the price again. Be an educated worker. Know the proper procedures that are required to get your job done and don't let anyone, including yourself, force you to disregard those procedures. Have a happy and safe workday.

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