

Proposal for an integrative methodology to development the ergonomic program

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Abstract. This paper collects the experience for both, academic and professional practice, and deal with the stages and level of involvement from different elements in the organization. The work is focused in some kind of concentric cycles, the very outside circle is formed by those that interact with ergonomic process in a year period, and the inner cycles are those that acts in a daily or weekly intervention. The success of the program still depending on the good will of the managers, but any action directed on benefit of the people at work, enable the moral as well as indicators for health and safety.

Keywords: Ergonomic program, kaizen ergo day, ergonomics assessment, standardization.

1. Introduction

Occupational health has been abundantly studied; risks factors, illnesses, disorders and much more. The benefits of occupational health or occupational ergonomics programs have been probed so many times, for instance the relationship between the work station design and the discomfort of the people. But the point is how the occupational ergonomics program should be design. a six sigma approach [1] it is basically a problem solving methodology and, of course, it is a very useful tool, but mainly deals with engineering controls and it is oriented to proactive approach.

Industrial grow in twenty century become on a engine for the world economy, is relatively easy to see how it was, just take a look on automotive or electronics industries, for instance, and will perceive a great offer in models, colors, styles, technologies. This growing has not been easy, it has some negative consequences; environmental and occupational health had been affected negatively. Automotive industry generate a lot on jobs, directly and

indirectly way, and from the sixties decade and until present time, its growing could consider a constant, with some crisis periods. According with data from the International Organization of Motor Vehicle Manufacturer [2] from 1997 to 2010, world production of automobiles has been by more than 50,000,000 cars each year, in 2010 and 2008; production reaches more than 70 million cars. The ILO [3] present a conceptual model for jobs created by the automobile industry, using the French Industry as a example, and data are impressive; for 182,000 jobs in manufacturing cars, there are 313,000 jobs related directly with it, manufacturing industry demands 773,000 jobs, that means almost 50% of manufacturing labor is in automobile industry. In world terms, the automobile industry generates [2] in 2010 about 8 million jobs, in México, 137, 000 people worked for automobile industry. INEGI [4] registered 436,851 manufacturing jobs. The data shows the big picture about the magnitude of people working in manufacturing jobs, locally and wide world.

Human kind has evolved for a millions of years until today, in the time line appear industrial

revolution which changed drastically how product are made and put into consumer hands, consequently labor has increases upon time resulting on more people exposed to repetitive work effects, thus human body systems was not either design or evolved for this work condition, [5] that is why musculoskeletal disorders (MSD) finally appear.

Ergonomic program is not a new strategy trying to control MSD and improve health, NIOSH [6] has a structured program, step by step and it could be used by a large number of industries. The approach included in this work tries another way, merging direction, evaluation, kaizen and standards development.

2. Method

Is relevant to emphasis that having an ergonomic program is a good sign and the results of it should be good, that is due to the work in ergonomics is good process management. Is important delimitate the use of this method to industrial work design. The layers are all important too and they all interact constantly.

The beginning should be the commitment of high level managers and it needs to become into a written policy, assigning an annual budget, following by the conforming of a group to design the ergonomic general program or evaluate the current program, tuition by an ergonomic certified consultant. The program has to become on the ergonomic operating system. It is important to propose a kaizen ergo day as a component on the ergonomics program. Kaizen ergo is a highly effective strategy to create or improve the conscience about ergonomics. The kaizen ergo day could be every three years and should be good to use some allusive promotional items like t shirts, banners or buttons. But, what is a kaizen ergo day? Simply, is a specific day when all white collar in the plant works like salary labor, a complete shift. Say all means plant manager, areas managers, support people and so on. They will be assigned to a work station; they will receive the correspondent training on manufacturing process, safety and quality. At the end of the kaizen ergo day, is recommended write all opinions down focused in perception about how good, or no good, work is going at plant. Kaizen ergo day promotes the eye on the process, opening all the chances to get feedback about the ergonomics and detecting potentials ergonomic issues.

Ergonomics operating system or Ergonomic Program (EP) is now engaged to the second layer; it is how the program works like a

process. The commitment this time goes to form or support a local ergonomics committee.

The second layer includes mapping the risk of occupational injuries or disorders. Mapping is one of the main activities for the LEC [11]. Usually a color code is helpful and the standard is green, yellow, red and black associated with the low, moderate, high and very high risk of occurrence an occupational injury. The question is how to map? There are a wide variety of assessment ergonomics methods, one of the most simply and effective is the Fatigue Muscular Analysis [1].

From risk mapping has to pass to an action plan, the final target is only green code workstations. That is, yellow and red code workstations should become green code workstations and black code, needs to get an immediately action to lower the level risk. It is important to establish additional criteria to code workstation, for instance, a medical complain should be a red code until root cause is determined, it implied a complete assessment of workstation. No matter a green code, if a person remains in the same workstation for more than six months doing the same job, it should be code as yellow. The 8 D's method is a useful tool to contain and prevent the same risk occurrence.

Additional assessment may be required depending on the kind of issue found, if static postures are the problem, it could be evaluated with 3D SSPP[®] [12] tool, if exist manual material handling, NIOSH revised equation [7] or Liberty Mutual Tables [8] could be helpful.

Another key element on the EP it is anthropometrics charts, this tool is basic for ergonomics language, it is the way to really match the ergonomics proposals and achieve the human centered design described in the International Ergonomics Association (IEA) definition [9]. Bustillos [10] shows how anthropometrics can be used to design or redesign workstations.

The second layer includes standardization. Standards could be for:

- Force limits on: thumbs push, pinch grip, hand grip, manual material handling.
- Time on awkward postures; overhead, overshoulder.
- Workloads efficiency and recovery time. It means for a minute of standard work, allow some recovery time.
- Weights, vibration and torque for tools.
- Weight of containers and materials

Standardization ergonomics process may require:

- Anthropometric chart and data,

- Anthropometrics criteria to assign people to workstations
- Buy-off procedures for tooling and MMM
- A LEC
- A responsible for ergonomics,
- Training on ergonomics
- Periodicity for updating the risk map,
- Excel[®] templates for assessments,
- Medical records related to occupational complains.
- Engineering and administrative controls

The third layer deals on work level. That is, how the people participate on work and workstation design and how team leaders are encouraged to take care of people. Is so important that every time that a process part is modified, ask to people about the changes, take opinions about the way they feel on new tools, about how they feel at the end of the shift; so tired, painful, stiffness or numbness. A good strategy is teach people to care themselves on ergonomics as usually in safety does.

Promote cross-assessments between work areas people. Promote people to buying processes; tools, mechanical aids, workstation design and work design. Recognize good practices, feedback constantly on good and bad ergonomic practices. Respect point of views from operators and group leaders.

3. Conclusion

There is, may be, no much new findings on this proposal, but it is an exercise going to put in some order the experience of several years on ergonomics practice and can be trust that it works. While ergonomics remain on job designers mind, we can be sure that people heal is going on right direction.

When people notes that industrial engineering goes to the production line not just to give them more work but going to ask about ergonomics improvements, people moral raises. When an ergonomic program works well, managers trust increases, especially when morale people rising up and safety and health costs go down every year.

4. Discussion

This work has the purpose to propose a method for integrate an ergonomic program. Here the elements of the program has been

arranged in order to involve every level in ergonomics. Usually, ergonomics depend on; industrial engineering department, safety and security department or medical services department. In practice, some times ergonomics looks disconnected. For instance, production levels in manufacturing industries depending on variability of international markets, when production rates increases, speed production increases too, in consequence, operators has to work faster, then, in function of time, complains about pain begin, until the first MSD. Like a process, medical reports should be attended and it is necessary to find a root cause for the occupational disorder. Who should be responsible for all the process? Having a ergonomic process is a manner to promote proactive ergonomics, and it make it easier to manage and prevent MSD. At the end of the day, when people are going back home, they should be healthy and with enough energy to enjoy the family life, and having enough energy to be back at work next day.

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