

THE APPLICATION OF “HUMAN-CARE SAFETY NET” INCLUDING THE USE OF PERSONAL PROTECTORS AS A NEW APPROACH TO THE PREVENTION OF FALL ACCIDENTS

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In recognizing the trends of today's accidents in industrial companies, I propose the introduction of a new approach for their reduction. In the industrial industry, there are full of unsafe acts and the human errors of workers. To overcome this problem, external protections for workers are necessary. My idea involves the combination of personal protective equipment, including 1) harness-type safety belts 2) detectors and alarms 3) signs and signals. These components together along with the ability to change the harness-type safety belts could eventually make up a unique robot suit.

Today's situation and characteristics of the occurrences of industrial accidents in the enterprises of Japan

(I) The Ministry of Health, Labour and Welfare (MHLW) made the 12th industrial accident prevention plan earlier this year to do its utmost to prevent industrial accidents.

1. Occurrences of accidents in the construction and manufacturing industries have successfully decreased over the last five years. Nonetheless, the construction industry remains the worst industry for accidents, with the largest number of accidents caused by a fall.
2. The largest number of industrial accidents related to falling has occurred in the transportation industry. Occurrences of industrial accidents have also increased in the services industries, typically in social welfare institutions.

(II) I would now like to comment on the characteristics as follows, according to my own analyses. Half of the industrial accidents that occurred in the industries mentioned above were ones involving human errors or the unsafe acts of workers.

The second is a “dual structure” between large-sized enterprises and small-sized ones. An occurrence of accidents is much more in number and much higher in rate in small-sized enterprises than in case of large-sized ones.

The characteristics and problems of long-continued preventative measures against industrial accidents by both government and enterprises

(I) Regarding these characteristics, my comments are as follows:

1. Preventative measures for safety have thus far included regulations, enforced by MHLW, on work, machinery, equipment, chemicals, etc., together with worker's qualifications, and as for occupational health specifically, working environment has been improved by “Working

Environment Measurement Law” enforced by MHLW.

In short, top priority of safety and health measures has been the engineering. Technical improvements should be applied first, for the working environment, workshops/working-space/buildings etc.

2. Generally speaking, the utilization of personal protective equipment has not been recognized as a preventative measure against industrial accidents. At best, they represent the last conceived means of prevention. Even today such an idea is not positively discussed/utilized to the extent of other preventative measures under any conditions.
3. The spread the Occupational Safety and Health Management System (e.g. OSHMS) and Risk-Assessment (e.g. RA) among enterprises has been promoted by the Ministry (MHLW).
 - (1) Thanks to the Ministry's efforts, OSHMS and RA have gradually become popular among large-sized enterprises.
 - (2) OSHMS and RA are instrumental for making managerial and organizational activities function because of their practical-orientated methods that are formulated with scientific rationale.
 - (3) Unfortunately, the introduction of OSHMS and RA alone, however, cannot prevent all industrial accidents involving human errors and the unsafe acts of workers.

(II) It is virtually impossible for us today to reduce occurrences of industrial accidents by our current on-going preventative measures alone without the introduction of a new method.

(III) Regarding the recent movements of full-body harness safety belts, the following trend is part of this category II :

1. In Japan it is usually thought of as natural to not only prevent the falls of workers but also to make the fall of the workers stop by utilizing counter-measures, including the use of safety belts.
2. As for safety belts, workers at workplaces have been accustomed to use traditional safety belts as preventative measures against fall accidents for many years under the enforcement of the Ministry's regulations.
3. At present, few people recognize the necessity of using full body harness safety belts for the reduction of physical damages to hanging workers due to a fall. It is not a problem for traditional safety belts to support the bodies of hanging workers considering the average Japanese weight.
4. The Ministry has begun its instruction and recommendation of the use of full body harness safety belts during specifically dangerous work for enterprises, considering full body harness safety belts as better personal protective equipment than traditional safety belts. Full body harness safety belts have been accepted by both revised regulations and JIS standards. With the same understanding as the Ministry, the JSAA also supports the use of full body harness safety belts.
5. From now on, workers will be accustomed to wearing full body harness safety belts in place of traditional safety belts due to the efforts of both the Ministry and employers. As a result of this, the number of industrial accidents due to falls can be expected to reduce in the near future.

The causes and counter-measures of the problems we face today

(I) The causes and counter-measures of human errors and unsafe acts of workers

1. Regarding these causes, the results of my analyses are as follows:

Considered from the viewpoint of human spiritual activities, unsafe acts by workers occur respectively from lack of knowledge and technology in the phase of intellectual function (e.g. from the intentional cut of any work-step in the phase of mind function, or from negligence of caution in the phase of emotional function). In addition, there would be also such affecting factors as the character (direct faults originate with it) of workers or the ageing of workers, which

inevitably or uncontrollably could be connected with unsafe acts. On the other hand, the relationship between human errors and workers is principally the same one as the above-mentioned case of unsafe acts, excluding unsafe acts done intentionally by workers.

2. Regarding the counter-measures, my idea is as follows:

It would be significant and helpful for us to recognize that both unsafe acts and human errors will happen due to limits of perception and consciousness, namely human ability. Workers cannot prevent their own errors and unsafe acts by themselves because they are beyond their ability. So, to prevent the occurrence of human errors and unsafe acts by workers and the industrial accidents brought by them, workers' acts should be externally interrupted/intervened and controlled by assisting them with a human care safety net.

(II) Regarding the causes and counter-measures of serious situations in small-sized enterprises, while considering the similarity with above-mentioned category, I would like to comment simply as follows (I):

1. A greater number of industrial accidents happen in small-sized enterprises than in large-sized ones due to a lack of money, technology and expertise in small sized enterprises that make them unable to follow the technical arrangements of working environments such as those in large-sized enterprises.
2. Small-sized enterprises cannot prevent the occurrences of industrial accidents by themselves due to these occurrences being beyond their ability to. Therefore the ability of small-sized enterprises' to prevent and respond to industrial accidents should receive external help and be strengthened by experts.

Approaches to the further reduction of industrial accidents

(I) Importance of “human-care safety net”.

It is very difficult today in Japan to have further reduction of industrial accidents beyond the current on-going counter-measures. Therefore we have to encourage the use of personal protective equipment as one effective counter-measure of industrial accidents so as to strengthen the effectiveness of such equipment. Regarding the utilization of personal protective equipment, I propose the idea of “arrangements of working environment against workers”, namely the establishment of a “human care-safety net” by combining personal protective equipment not only with sensors and alarms, but also signs and marks. Here, I would like to emphasize that my idea concerns the prevention of worker's fall itself, without interrupting the worker's fall by using the above-mentioned method.

(II) In regards to the overall assistance by external experts for small-sized enterprises, my proposal is that small-sized enterprises should have good access to overall care given by external experts or corporations, including the necessary knowledge and proper methods of using personal protective equipment (which they usually depend on) so that these enterprises might advance towards the prevention of industrial accidents.

(III) In the future, we can expect the development of changing full body harness safety belts into robot-suits, and the introduction of these into the counter-measures against industrial fall accidents. In Japan, for many years both the government and enterprises have been doing their best to research and develop industrial robots, including human-type ones. In recent years, the number of elderly persons who need external care has largely increased. In order to assist them, makers are earnestly trying to develop robots to compensate for an elderly person's weakened physical ability/function. Considering this dynamic situation of developing above-mentioned robots in the field of social welfare, I sincerely expect the realization of a “fall-industrial-accident-prevention-robot-suit” that covers all of my ideas here presented, namely the above-mentioned arrangements of ‘working environment against workers = establishment of “human-care safety net”’.

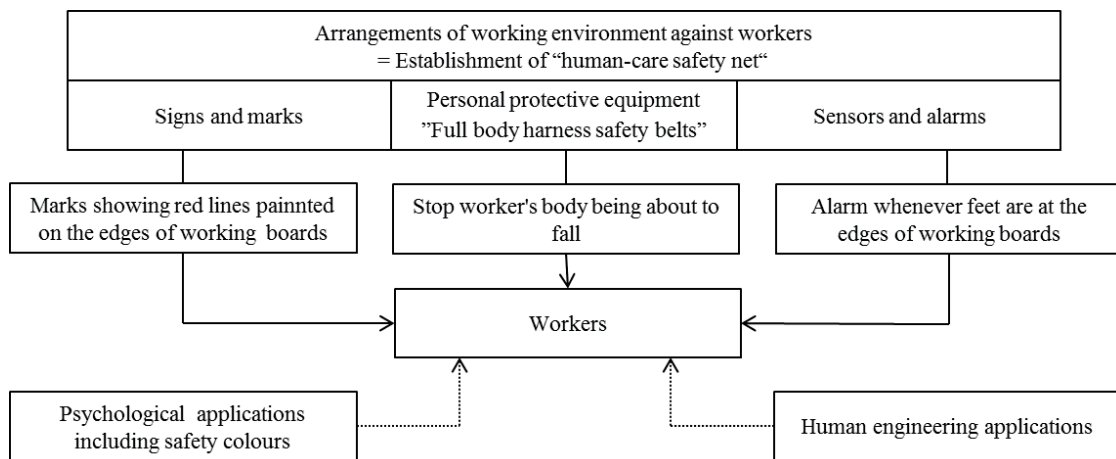


Figure 1 Example of the arrangements of the working environment against workers