

Challenge of Zero Accident and Zero Disaster

Keywords Zero accident, Zero disaster, Zero Occupational Health and Safety incident

Abstract

Occupational Health and Safety (OHS) incidents caused in all industries including construction industry have continued decreasing until 2007. This decreasing trend ceased in 2008 and plateaued until now. To break this trend and sustain a status of Zero OHS incidents, we analyzed past records of OHS incidents based on “OHS incident occurrences” data and in relation to the “rate of construction workers by age group,” and was challenged to prevent any occurrence of OHS incidents through a hands-on “safety training program” promoted at project sites as a preventive program.

1 Preface

Due to the revision of the Industrial Safety and Health Law and Facility improvements, Occupational Health and Safety (OHS) incidents in Japan steadily decreased between 1970 and 2008. From 2008, however, this level has plateaued and the number of accidents has stayed level. Fig. 1 shows the situation of OHS incident occurrence in Japan (in all industries).

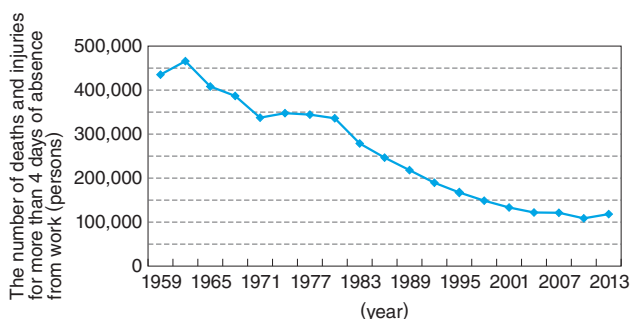
OHS incidents caused in our Plant Construction & Engineering Business Group (the “Group” hereafter) tended to decrease from 1970 to 1980 but thereafter, 2 to 4 incidents on average per year have occurred. This shows that we could not realize or sustain “Zero Accident.” Fig. 2 shows the situation

of OHS incident occurrence at the Group.

Fig. 3 shows the incident rate of workers by age group ranging 55 years old and above and 29 years old and below. It is apparent that the rate of workers of age 29 years and younger is tended to decrease and the senior age group workers in construction industries are rising. Such a tendency suggests the possibility of an increase in OHS incidents. This paper introduces our programs to prevent OHS incidents and their results.

2 OHS Incidents Analysis Conducted by Our Group

From 2012 to 2014, there was one OHS incident causing a 4 or more days of absence from work



Note: The number of deaths and injuries number is cited from materials of industrial accident insurance benefit payments compiled by the Ministry of Health, Labor and Welfare in Japan.

Fig. 1 Situation of OHS Incident Occurrence in Japan (in All Industries)

During the period from 1970 to 2008, the occurrence of OHS incidents in all industries consistently decreased in Japan.

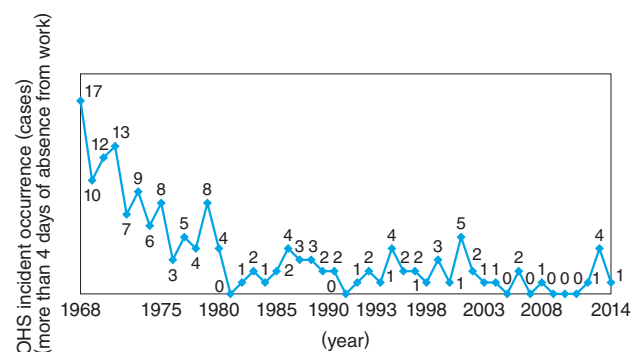
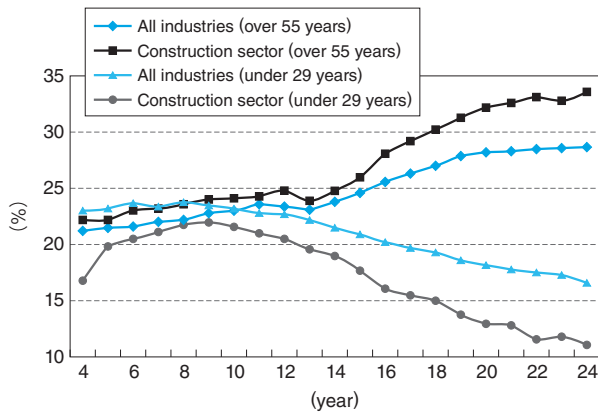


Fig. 2 Situation of OHS Incident Occurrence at the Group

During the period from 1970 to 1980, the occurrence of OHS incidents decreased at the Group. Thereafter, however, a plateau has continued. There have been about 2 to 4 cases every year.



Note: Calculate percentage based on "Labor Force Survey" by Ministry of Internal Affairs and Communications.

Fig. 3 Incident Rate of Workers by Age Group Ranging 55 Years Old and Above and 29 Years Old and Below

In all industries, workers over 55 years old are increasing while those under 29 years old are decreasing by the year.

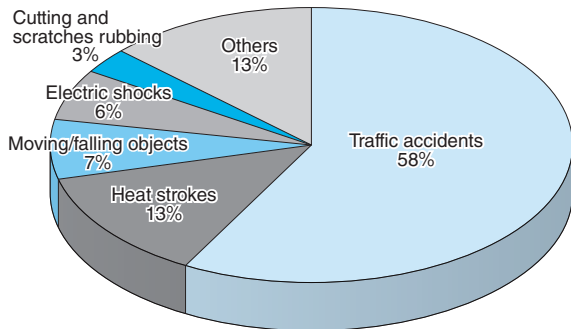


Fig. 4 Situation of Accidents Sorted by Types (2012 to 2014, 31 Cases in All)

Situation of accidents sorted by types from 2012 to 2014 is shown.

case in 2012, 4 cases in 2013, and 1 case in 2014. OHS incidents/accidents causing no leave of absence or traffic accidents (including injuries during commuting period) were 8 cases in 2012, 13 cases in 2013, and 10 cases in 2014.

Fig. 4 shows the situation of accidents sorted by types and **Fig. 5** shows the situation of accidents sorted by age group. The rate of occurrence of traffic accidents is 58%, which is considered very high. Other accidents are classified as follows:

- (1) Heat strokes caused excessive heat wave in recent years
- (2) Injuries caused by moving and falling objects during unloading delivery rigging work
- (3) Electric shocks or electric burn injury during unscheduled work
- (4) Accidents caused by older, younger, or inexperienced workers

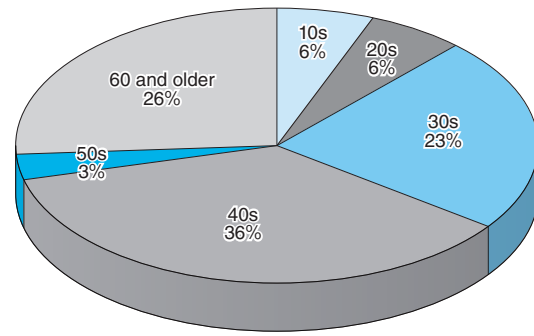


Fig. 5 Situation of Accidents Sorted by Age Group (2012 to 2014, 31 Cases in All)

Situation of accidents sorted by age group from 2012 to 2014 is shown.

3 Our OHS-Related Activities and their Results

According to the result of OHS incidents analysis, we conducted OHS-related activities focusing mainly on measures with high level of urgency and effectiveness. The seven items described below were conducted.

3.1 Countermeasures against Heat Strokes

Due to recent years' heat wave and increase in construction project work for photovoltaic power generation facilities (outdoor work), frequent accidents resulting from heat strokes at our project sites were caused in 2013. Consequently, countermeasures against heat strokes were strictly taken as well. As a result, the occurrence of such injuries at our project sites became zero in Fiscal 2014 (only 1 case in Fiscal 2015).

- (1) Drafting an action program against heat strokes and during Heat Strokes Prevention Months (June to September)
- (2) Compulsory wearing of heat stroke precaution thermometer
- (3) Heat stroke prevention training with DVD for all workers
- (4) Active use of a "check sheet" that addresses each worker directly

Since the symptoms of heat strokes are substantially influenced by the physical conditions and medical history of each individual, achieving zero status in accidents is difficult to attain. For this reason, emergency transport by ambulance is an obligation at our project sites in Japan.

3.2 Use of Guide for Drafting Carrying-in and Carrying-out Work Plan

Since April 2014, we have been using the carrying-in and carrying-out work plan based on our own check list template. There were many descriptions, however, of specific procedures that were not clearly mentioned. Due to this concern, we issued a “manual” that supplements when the draft plan is issued. This manual covers the check list template, guidance to access relative documents, and important assessment points for a site survey. It comes with drawings and photos which makes explanations easy-to-understand. In addition, our Safety Control Section reinforced the preliminary assessment of the “Carrying-in and Carrying-out Work Plan.”

As a result, our group engineers improved the work plan with more detailed and easy-to-understand plans compare with previous ones. This has decreased accidents the number of during carry-in and carrying-out work. The basic knowledge in this manual was translated in to English. It became training text book for the basics of carry-in and carrying-out work plans for Meiden Group’s engineers in the Association of South-East Asian Nations (ASEAN) Region. This textbook is currently actively used for training for our construction engineers in the ASEAN Region.

3.3 Eliminate Unscheduled Work

Unscheduled work directly relates to the incidence of accidents. To realize “zero” unscheduled work, we have instructed our engineers to give specific job instructions and issue work procedure order sheet plans. In addition, we made it a practice to call out “Prohibited Action Items” during afternoon gatherings after lunch. In the change happens in the work schedule after the morning briefing, we update work instructions, work procedure, and hazard prediction activities. If a worker deviates from the normal work procedure or if an abnormal situation is identified, we state protocol to “stop work, call the supervisor, and wait for further instructions.” Only after safe conditions are confirmed, the restart of work is allowed. Holding the operation to this protocol, the occurrences of unscheduled work decrease.

3.4 Countermeasure against the Older and Aging Workers

On a construction site, one out-of three workers is older than 55 years old. An aging society is

increasing in Japan. Half of the workers on a construction site are expected to be seniors. The occurrence of occupation accidents increases for workers over 50. It is, therefore, necessary to provide a safe and secured project site environment for them.

Previously, construction work policies for senior workers were unclear. Therefore, in September 2015, a work policy was issued and the enforcement of the three management points specified below began.

- (1) The start of a permit application of “senior worker work permit protocol”
- (2) Identify senior workers by a sticker their safety helmet
- (3) And work restriction by age group

The definite effect of these actions are still unclear, but we will continue to monitor efficiency through further investigation and assessment.

3.5 Introduce Cut Resistant Gloves

In the past, there were many work tasks that required the use of a knife. These days, however, due to the improvement of work tools, work tasks can be done without using knives. For this reason, workers with less experience using knives are increasing. But because of the nature of work on site, work with knives is still required. For such cases, we have introduced and distributed cut resistant gloves (cut wound level 5) to all workers at all of our project sites to prevent cut-injuries.

3.6 Deployment of Safety Hands-on Experience Training at the Project Sites

At a time when many accidents and injuries occurred, everyone was aware that they too could be susceptible. Due to the reduction of occupational accidents, a lack of experience against accidents lowered the “sensitivity” level.

In order to prevent any accident or incident, each worker has to refresh and raise their prediction abilities. Since 2009, we have frequently conducted our unique safety hands-on training programs in Tokyo and Numazu where our major business offices are located. This training program is based on themes of “seeing,” “touching,” “hands-on,” and “senses.” Attendees were mostly on-site management class engineers. Victims who face the accidents are workers working at the project site. For this reason, we plan training program visits and execute efficiency at our project sites. **Table 1** shows a list of safety training equipment. We have produced

Table 1 List of Safety Training Equipment

A list of safety training equipment owned by the Group is shown.

Type of accident and incident	Name of safety training equipment	Type of accident and incident	Name of safety training equipment
Electric shocks	Electric shock Experiencing Unit (EU)	Falling down	Cataract EU
Electric shocks	Ground discharge EU	Falling down	Child eye EU
Electric shocks	Welding base material ground failure EU	Falling down	Drunken drive EU
Electric leakage	Leakage breaker EU	Falling down	Walk and slip EU
Fire	Tracking EU	Pinching	Caught by rotor EU
Fire	Wire burning EU	Pinching	Safety shoes strength EU
Fire	Electric wire reel burning EU	Pinching	Finger pinching by slinger EU
Explosion	Dust explosion EU	Low back pain EU	Lumbago EU for heavy article transportation
Falling accident	Safety harness hanging EU	Others	Pointing and calling safety EU
Falling accident	Doll falling crash EU	Others	AED-aided EU
Moving and falling	Moving and dropping bolt EU	Others	Cable drum with metal sensor EU

22 types of safety training devices including our originals with a transportation container. Since Fiscal 2014, this type of training program has been carried out to our project site in Japan and at the ASEAN region (Meiden ASEAN Training Center in Thailand). Fig. 6 shows a view of safety training program and Fig. 7 shows a view of safety hands-on experience training program in the Thailand.

3.7 Implementing of Preventive Measures against Traffic Accidents

We made a mandatory policy of installing drive recorders in all vehicles used by our business Group in Japan, including rental cars.

If anyone caused a traffic accident, the driver must take a safety drive training class. In addition, we created an on-line network vehicle operation management system to visualize and identify activated vehicles driven on-time. From these improvements, traffic accidents have been reduced.

4 Postscript

It is difficult to eliminate all hazardous/dangerous factor from project sites. To accomplish and



(a) Safety hands-on experience training program



(b) Preliminary lecture-style lesson



(c) Safety harness hanging EU



(d) Electric shock EU

Fig. 6 Safety Training Program

Several Views of safety hands-on experience training programs conducted across Japan are shown.



(a) Wire burning EU



(b) Safety harness hanging EU



(c) Falling impact EU

Fig. 7 Safety Hands-on Experience Training Program in the Thailand

Several views of safety training are shown.

sustain zero accidents and zero disasters, each worker at a project site has to be committed to avoiding the hazards and danger. We put our full energy into sustaining a zero accident and zero disaster policy at our project sites.

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