



Realize Progress of Railway Safety and Prevention of Human Errors
by Considering Specificity of Human

~ Think from "Railway Safety," "Industrial Safety,"
"Prevention and Reduction of Disaster"

East Japan Railway Workers' Union
(JREU)



JREU's Challenges from Work Places to Establish Safety

Premise of Human Labor

➔ "Human Makes Mistakes"

Characteristics of Human Errors

- ① Mode "error" is not in the human brain.
- ② Result of hard working is error.
- ③ Punishment cannot prevent incidents which happen again.
- ④ Investigation of behind factors should be prioritized.



Human Errors ➔ Impossible to prevent occurrence

➔ How we confront and prevent

It is our fate to confront by prevention of Human Errors

To realize safe operation of trains.

JREU's Challenges from Work Places to Establish Safety

Views When We Consider "Railway Safety"

- ① **"Labor safety"** ; environment of work places.
- ② **"Preventive / reductive safety"** ; realizing measures for large-scale disasters.
- ③ **"Preventive safety"** ; comprehend problems at work and counter.
"Predictive safety" ; predict changes and counter technologically.



In this case, important things are **"Human Factors."**

"Human Factors" is defined as...

a practical study of knowledge, concept, and technique of human ability and its limit, sensory illusion, carelessness, shortcut act, and omitted act which are needed to operate machines and system safely and effectively



JREU's Challenges from Work Places to Establish Safety

◆ Consider a physiological phenomenon, "a doze."

JR East implemented SAS inspections for all drivers (from 2003) and all conductors (from 2017)!



Phenomena that crew who passed ASA inspections felt temporary sleepiness and fell asleep are occurring!

◆ Behind Factors

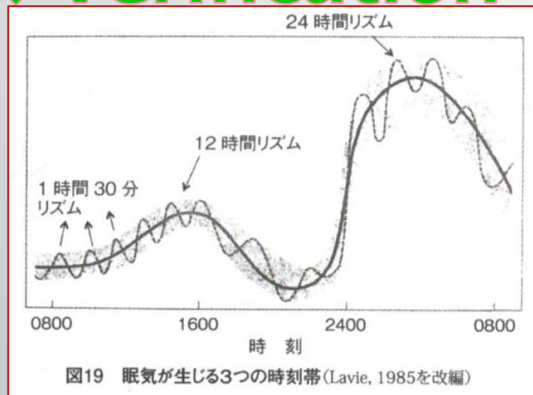
- ① Work place and resting place are not divided with wall, and crew members have to take a rest in the situation that they can be seen by other crew members who are working.
- ② Automation makes jobs simple, but long hour shifts are set up and crew members' burden of mental and physical become huge.

JREU's Challenges from Work Places to Establish Safety

◆ Measures JR East has done

- ① Sleep logs to all drivers and conductors.
- ② Questions consciousness as a crew member and gives severe punishment.

◆ Verification of Rhythms of Sleepiness



“Sleepiness” has 3 rhythms; 24-hour rhythm, 12-hour rhythm, and 1 hour 30 mins rhythm.

In general, we feel sleepiness after meals, however, these 3 rhythms have sleepiness cycles which are not related to meals. In 12-hour rhythm, we feel sleepiness from 2 p.m. to 4 p.m.

◆ Truly Necessary Measures

- ① To make shifts with consideration about sleepiness rhythms.
- ② To make place where crew members can be relaxed in a short time.

Perceive problems during train service and implement “preventive safety” which prevents incidents.



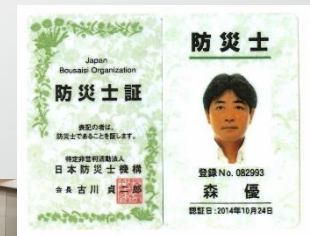
Historical Lessons Create Safety in the Future

◆ Airline Industry Launched “Preventive Safety”!

“Predictive Safety” is to consider safety problems during a job preventively, and predict how problems develop, and implement measures for safety.

◆ Activities for “Prevention and Reduction” is a first step for “Predictive Safety”!

217 union members became disaster prevention experts. They take a leading part of making hazard maps about each train line in JR East. We are doing such activities everywhere in Japan with the foundation of lessons we learned under The Great East Japan Earthquake!



From “nothing happened(present)” to “implementation of measures by considering the worst incident”.

Severe Incident that We Could Not Make Good Use of Lessons.

◆ April 4, 2015 Collapse of the Electric Pole in Yamanote Line

Because of wrong alterations of plans and wrong operations, the overhead line's strength weakened and it could not support 5 tons of tension, so the electric pole collapsed.

◆ Who noticed a slope of the pole?

【Construction】 Noticed on April 10. No urgency. Planned construction on April 13.

【Driver】 Noticed April 11. The information was not transmitted to the maintenance section.

【Maintenance】 Went to the pole and noticed on the day the pole collapsed. Did not determine to stop trains.

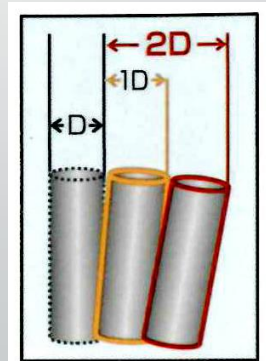
◆ Stop Trains When Crew Members feel danger!

Measures of JR East

Established "diagnostic criteria of abnormality of a slope of the pole."

The essential factor is

depression of risk control and management ability to predict "collapse→collision→severe incident."





Make “Predictive Safety” to Global Standard of Safety Management

◆ **What is in front of us is not safety but “danger.”**

“Absolute Safety” does not exist in human labor!

◆ **Understand Human’s Characteristics and Manage Risks!**

Human makes mistakes, however, has sensitivity and sense that can observe risks!



Manualized operation and severe punishment policy increase risks that make sensitivity and sense become dull!

From “pursuing liability” to “cause investigation.”

Realize “preventive safety” and “predictive safety”!