



ITSA State Recent Developments and Experiences - ITSA May 2021

State: Japan

Presented by: Nobuo Takeda, Chairperson

Introduction

Due to the rapid increase in the number of Covid-19 infected people in Japan, the Government of Japan declared a third state of emergency for Tokyo, Osaka, Kyoto and Hyogo Prefecture on April 23. The announcement period is from April 25 to May 11. (The past announcement period is: 1st time: 2020.4.7-5.25, 2nd time: 2021.1.8-3.21)

JTSB investigators and staff had worked from home except when authorized by their managers to come to the office. But now, they work at the office once or twice a week. They must commute for staggered working hours, and endeavor to reduce the risk of infection as much as possible.

Also, they have to measure body temperature every morning and evening, and report the result of measurements with their condition to their manager. If they have a fever or feel ill, they are not allowed to come to work and are given special leaves. In the office, they must always wear masks and ensure appropriate distance from others.

From March 2020 to March 2021, 46 cases of accidents and incidents have occurred (21 Aircraft, 14 Railway and 11 Marine), and JTSB investigators have conducted some on-site investigations, taking measures to prevent infection. Some investigations had to be postponed, but we have made use of telephone and e-mail more widely than usual for collecting information, to minimize the delay of our investigations. Meetings of the board have been held with some preventive measures for infection; the minimum participants necessary, frequent breaks and ventilation and so on.

| Investigations launched in 2020 | |
|--|------------------|
| Aircraft accidents and serious incidents | |
| Number of Investigators | 26 |
| Accidents | 13 |
| Serious Incidents | 9 |
| Total | 22 |
| Railway accidents and serious incidents | |
| Number of Investigators | 19 |
| Accidents | 13 |
| Serious Incidents | 2 |
| Total | 15 |
| Marine accidents and serious incidents | |
| Number of Investigators | 23(HQ)+42(Local) |
| Accidents | |
| Head quarters | 14 |
| Local offices | 718 |
| Sub-total | 732 |
| Serious Incidents | |
| Head quarters | 0 |
| Local offices | 173 |
| Sub-total | 173 |
| Total | 905 |

COVID19 Update:

State number of cases of COVID19 Infection: 565,765 (as of 27 April 2021)
 State number of new cases being reported weekly (7 days): 33,324
 State number of deaths: 10,001
 Number of people in hospital care: 51,606
 Number of infections/deaths in JTSB: 1/0



Current Status of State:

Even after lifting the State of Emergency, maintaining a distance of 2m from others, wearing sanitary masks, careful hand-washing, measuring body temperature every morning and so on are encouraged, as “New Lifestyle” presented by Japanese government.

For entry or departure, there are following restrictions;

- Those who are unable to present a certificate of inspection within 72 hours prior to departure will not be allowed to land Japan.
- It is necessary to submit a written pledge not to use public transportation for 14 days, to stay at home or in accommodation, to save and present your location information, and to install a contact confirmation application etc. when entering Japan.
- Travel Warning (Level3: Avoid All Travel) is being issued for many countries

Case Studies and Challenges

Please refer to attached document for case (a) and (b).

a. Failure of High Pressure Turbine Blades ([JTSB Accident Report AI2020-3](#))

<Summary of the Serious Incident>

- On May 24, 2018, a Boeing 767-300 had noise accompanied by vibration as well as reduced rpm of No. 1 engine during the climb after the take-off from Kumamoto Airport. The Aircraft therefore returned to the Airport.
- The post-flight inspection revealed that high-pressure and low-pressure turbines of the engine (GE CF6-80C2B4F) were damaged in several stages and a hole was generated in the engine casing.

<Probable Causes>

- It is highly probable that this serious incident was caused by the fractured blade #13 on HPT (high pressure turbine) stage 2 of No. 1 engine (left side), when the Aircraft was climbing, that damaged blades and stator vanes of aft stages, fragments of which collided with LPT (low pressure turbine) casing and generated a hole (crack).
- It is highly probable that the fractured blade #13 was caused by cracks that were generated on TA (Turning Around (branching and turning around of cooling air flowing inside blades)) area and progressed thereafter.
- It is somewhat likely that cracks generated on TA area were caused by hot corrosion swelling (blister) generated on the coating layer of the blades and low-cycle fatigue initiating from the cracks.

<Safety Actions>

- The engine manufacturer is set to monitor cycles in use of the same type of blades and continuously verify events confirmed in flight or in maintenance. In addition, in order to replace blades with new models, the engine manufacturer issued fleet highlights and provided



defect occurrence information including blade breakage and previously issued technical reports (SB) and so on to operators and maintenance companies.

b. Collision to Car Stop of Unmanned Train System ([JTSB Accident Report RA2021-1](#))

<Summary of the Accident>

- On June 1, 2019, when the driverless train (5 car train set) was departing from the starting station, it proceeded in the opposite direction to the original direction of travel, and it collided with the car stop at the end of the line at the speed of 25km/h and stopped. 17 of 25 passengers were injured in this accident. (12 passengers were seriously injured)

<Probable Causes>

- In the equipment room of the first car, a vehicle component (end rail) came into contact with the command line in the direction of travel, and the line was disconnected.
- Due to the disconnection of the line transmitting the direction of travel command ;
 - (1) Information in the previous inbound direction is maintained in the memory inside the motor control device, and the train started in the opposite inbound direction.
 - (2) The retraction detection function etc. did not work.
- In the vehicle design and manufacturing process, the operators, vehicle manufacturers, and equipment manufacturers did not sufficiently confirm and coordinate their understanding of the design system, basic concepts and specifications, and identify safety requirements prior to design. In addition, it is somewhat likely that they did not aware of insufficient safety assurance against abnormal conditions such as reversing due to insufficient verification of safety.

<Recommendation and Opinion>

- JTSB issued recommendations to the Minister of Land, Infrastructure, Transport and Tourism that the Railway Bureau should instruct railway operators and vehicle manufacturers regarding the design process of manufacturing and modifying the system for "automatic operation without a driver on board".
- JTSB issued opinion to the Minister of Land, Infrastructure, Transport and Tourism that the Railway Bureau should consider the institutionalization of each matter mentioned in the recommendation from the viewpoint of preventing the occurrence of potential causes of dangerous events in preparation for the spread of autonomous driving systems in the future.

c. Quantitative Assessment of Collision Risk Based on Actual Behavior Analysis of Collision Avoidance Maneuver - Report of collision of three container ships at Yokohama ([JTSB Accident Report MA2021-2](#))

Please refer the technical presentation of Dr. Kenichi TAMURA, Member of JTSB