

Gist of the Symposium on “Advanced Maintenance”

I. Civil engineering for Infrastructures

1. Prof. Tsukahara suggested the importance of governmental standard, management system, financing system, cooperation among companies, etc. in surviving and recovering from disasters.
2. Dr. Lee explained that through some accidents, importance of maintenance has been widely understood in Korea. Although budget is insufficient, new action plans are ongoing.
3. Prof. Ou explained definitions of Life-cycle Performance of infrastructures and general steps to maintain the performances. Also introduced practical targets and model-based approaches for bridge maintenance.
4. Prof. S. Takata mentioned Life Cycle Maintenance Framework of general artifacts, and some different categories of maintenance strategy. It suggested that suitable maintenance strategy should be chosen based on the feature of the system.
5. Prof. Park categorized maintenance work to project work and operation work. Then, showed concept of project ecosystem, its competency model, management framework and a case study regarding Incheon Bridge Project.
6. Prof. Du introduced situations of rapidly growing Chinese transportation system. Also explained, because of various environment due to the width of the country, there are many challenges and many countermeasures.

Discussions

- Since population is decreasing, social infrastructure should be adjusted to the situation.
- Situation regarding maintenance in each country.
 - > China: inspection, monitoring, etc... such technologies should be properly used and embedded to design long-life of social infrastructure.
 - > Korea: even the population is decreasing, new infrastructures will be required to meet the new situation, new lifestyle, and so on.
 - > Japan: optimum maintenance cycle to prolong lives of infrastructures. New governmental strategy of “compact city.”

II. Equipment engineering for Industrial Plants

7. Prof. Chen introduced technological situations and future steps in China for monitoring, inspection and diagnosis, targeting petrochemical industry.
8. Dr. Yuon explained fault diagnosis and process management system of industrial machineries. As the case studies, monitoring and health check of gearbox of industrial robots and rotor of power plants were introduced.
9. Dr. Ichikawa explained process management system which combines various data monitoring and data modeling. Development will enable smart and efficient manufacturing system called “Web of Manufacturing.”
10. Prof. Han mentioned about health monitoring and fault prediction system, especially for rotating machineries. As typically seen in aircraft engines, since failures in such machines may cause serious accidents, it is strongly focused.
11. Prof. Jung explained risk-based inspection and maintenance effort using underground pipelines as examples. Because of the difficulty in frequent inspections, such technology is very significant and effective.
12. Prof. Y. Takata introduced hydrogen related facilities and studies in Kyushu University. Towards implementation of hydrogen society, new monitoring, securing safety and refueling technologies will be necessary and are under development.

Discussions

- Future of hydrogen fueled vehicle was discussed.
- Regarding the topic of the symposium, situation in China (rapid and huge amount of construction work is ongoing) was mentioned and discussed.
 - > CAE is promoting research projects regarding maintenance.
 - > China is focusing on PHM technologies and collaboration opportunities are welcomed..
 - > Korea and Japan are now have some projects regarding the area and international conferences will be held.
 - > Various areas and targets of maintenance were discussed and various maintenance concepts and methods were introduced. The topic was very significant.
 - > Are there any schemes to study management systems, training, standard, etc. regarding maintenance?
 - > The situation is changing and fostering of engineers has started.

III. Summary and proposal

1. In growing era, we only considered “how to build.” However, in corresponding to the new situation in which “amount of social infrastructures has almost saturated,” “population has started to decrease” and “budget for maintenance is very limited,” a new strategy is necessary.
2. As the technological aspects, IoT, robots, new sensors, etc. can be factors to progress “advanced maintenance.”
3. Embedded monitoring systems from construction can be a good idea.
4. As the economic and political aspects, we also have to consider “how to maintain” and even “how to abolish.”
5. Strategic prioritization will be necessary.
6. Therefore, importance and necessities of maintenance technologies will never decrease.