

## **Department of Systems Engineering and Engineering Management**

### Seminar Series

# **Assessing Availability-Based Prognostics and Health Management enabled Condition Based Maintenance Policy Using Discrete Event Simulation**

**Mr. OMOLEYE Taiwo Joel**

PhD candidate

Department of Systems Engineering and Engineering Management  
City University of Hong Kong

Date	12 September 2017 (Tuesday)
Time	10:30am - 11:30am
Venue	B6619, Yeung Kin Man Academic Building (AC1)

### **Abstract**

The benefits of prognostics and health management (PHM) to condition-based maintenance (CBM) have been constantly highlighted in published literature to improve reliability, availability and to provide a proper lead time for planning and scheduling maintenance actions. However, the prediction process is saddled with uncertainties related to data measurement, operational and environmental current and future loading conditions which affect the accuracy of remaining useful life (RUL) prediction. The effect of these uncertainties results in overestimation and underestimation of RUL, leading to frequent corrective and preventive maintenance. As a result of improved developed models and methodologies used in prognostics and health management (PHM), the accuracy of fault prognostic tools has increased. The current approach to CBM implementation in practice is to perform condition-based preventive maintenance as soon as detection of the abnormal operating condition of an engineered object is observed. Using this approach, some proportion of the RUL is left unused. However, PHM-enabled CBM has the potential to further minimize the RUL, resulting in improved operational availability. A variant of availability definition in the literature is utilized to capture the added benefit of PHM-enabled CBM policy. This new approach is compared with the classic CBM policy, and traditional maintenance policies using ARENA®-based discrete event

simulation model. Exploiting different accuracy of the prognostic tool, simulation results suggest that PHM-enabled CBM policy improves the operational availability, as compared to classic CBM, scheduled preventive maintenance, and corrective maintenance policies. However, as the accuracy of the prognostic tool decreases, classic CBM becomes superior to PHM-enabled CBM, scheduled preventive maintenance, and reactive maintenance policies. Hence, the potential benefit of PHM-enabled CBM policy is highly dependent on the effectiveness of the prognostic tool.

## About the Speaker

**Taiwo Joel Omoleye** is a Ph.D. student in the Department of Systems Engineering and Engineering Management, City University of Hong Kong, Kowloon Tong, Hong Kong. He received his MSc in Advanced Control and Systems Engineering from University of Sheffield, UK and BEng in Electrical/ Electronic Engineering from University of Ado Ekiti, Nigeria. He is a member of Institute for Operations Research and the Management Sciences (INFORMS) and Institute of Electrical and Electronics Engineers (IEEE). His research interests include simulation modeling for service sectors, prognostics and health management, optimization, and maintenance engineering.

---

Enquiry: 3442 8408

*All are Welcome!*