Design For Maintainability 6th Run

By Dr. Kang Kok Hin

IES Academy

Introduction

While we are aware that it is not the responsibility of the architect/designer to maintain the facility upon its completion, this is not fully appreciated during the design process. When design decisions are made without regard to the maintenance perspective, it can often lead to a facility that incurs more cost to maintain or that has components that simply cannot be maintained. As facilities are completed, the owner's maintenance responsibilities begin and increase with the ageing of the facilities. The lack of maintainability is sometimes further aggravated by man power shortage and budget reductions.

Given the maintenance issues that can arise, a fundamental understanding that facilities can be designed to be more maintainable will lead to lower cost of operation and higher safety during the entire building life.

The objective of this course is to provide all stakeholders of a project the understanding and techniques when designing a facility to achieve high maintainability and productivity post construction.

Objectives

- System performs as required over the lifecycle to satisfy mission
- System conforms to design intent and performs as planned
- System remains functional for intended lifetime, environment, operating conditions and usage
- System is tolerant to faults, failures and other anomalous internal and external events
- System is designed to have an acceptable level of availability and maintainability demands
- To facilitate an integrated design and verify compliance to
- Reliability Centered Maintenance approach
- To conduct cost-benefit analysis of options, explore innovative solutions to enhance Maintainability scores
- To coordinate the documentation process necessary for smooth certification and implementation
- To understand the importance of maintainable FM and whole Life Cost of Assets will enable value creation and Green Productivity in the built environment

Programme Details:

Date : 15 Oct 2024

Time : 9am – 5.30pm

Venue : IES Academy @ Jurong East

CPD : PDU (PEB) / PDU (SCEM)
To be confirm
Course Fee : $327.00 (IES Members)
$403.30 (Non Members)

Certificate of Attendance will be issued to participants with **100% attendance.*

Prerequisites:
- Diploma/Degree in engineering with minimum 2-3 years relevant working experience

OR
- Preferably SCEM, GMFM, GMM, GMP with minimum 2 years relevant experience

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Target Audience

Property Developers, Fund Managers, Architects, M&E engineers, C&S engineers, Quantity surveyors and Chartered Engineers/Valuers, Facilities managers, Plant and production Managers, Maintenance practitioners, Contractors, System Operators, Asset Owners and Accounting Professionals, Project Managers who wish to explore the opportunities of introducing best practices in maintainability management with the objective of improving their productivity, cost effectiveness and efficiencies via the use ascent software, cloud computing or equivalent.

Course Syllabus

Architects, M&E engineers, facilities managers, plant managers, maintenance personnel, senior technicians, contractors, operators, owners and property developers, project managers and project executives, who wish to explore the opportunities of introducing best practices in facilities management with the objectives of improving their maintainability, reliability, productivity, effectiveness and efficiencies.

Lesson Plans

Topic 1: Design For Maintainability

Total Cost of ownership (TCOL) is a function of maintainability and during design process, ability to minimize number of bruised knuckles. Transform built environment towards higher productivity requires efforts across entire building value chain.

Process must begin at early design stage with adoption of labor-efficient and maintainable design strategies to enable productive construction methods & efficient maintenance operations. With greater emphasis on sustainable developments and improving building performance, the concept of maintainability is increasingly relevant to minimize Life Cycle costs and resources to function efficiently without catastrophic adverse consequences.

Four (4) important principles being identified:

- Forecast maintenance – Designers understand impact of designs and expected downstream maintenance works, making upstream design provisions.
- Access for maintenance – Designers give due considerations for all areas requiring access for inspection and maintenance.
- Minimize maintenance interventions - Designers give adequate attention to materials performance and detailing to minimize common and critical defects.
- Enable simple maintenance – Designers consider standardization and prefabricated components to facilitate easy inspection and productive maintenance e.g. standardization; Modularization; Functional packaging; Accessibility; Malfunction annunciation; Fault isolation; Identification and etc.

Topic 2: Configuration of Data for Benchmarking &Key Performance Indicators (KPIs)

In Asset FM, objective of this process is to accomplish integrated control system, where corporate and functional Strategies are transferred to all support processes, activities, tasks and personnel. The challenge is to select and meet KPIs, use selected KPIs to reduce cost, predict accidents/risks and increase building performance without loss financially or loss of life. The main topics are:

- What is KPIs, and how to select proper KPIs in Asset FM
- What is the benefit of adopting KPIs
- How to interpret different KPIs, and how these KPIs can improve the decision-making process and improve the overall building/plant/equipment performance
- The reduction of criticality of the adverse impacts

Topic 3: Building Values Management in Asset &FM (AFM) Services

AFM practitioners at times may not realize the inter-relationship of risk and values. Added value which AFM can bring to Organization is increasingly recognized. How do you make it visible and measurable in the context of risks? We should have overview of how Asset FM manage values, practical tool with which to clarify FM detaching itself from traditional view of cost saving department and viewed as essential asset–importance for staff to be proactive and productive, or strategic enabler for image and culture of company. There is increased focus on defining real added value services if there is any mismanagement or failure in operation.

The objective is to translate theory of added value into practice. The result is a dashboard or tool to show and measure the added values. The ways in which added value of FM is demonstrated and managed by six financial institutes in the largest segment (between 6,800 and 27,500 employees). Critical Success factors were identified and conceptual model developed to clarify integrated added values.

AFM ranked cost control and reduction, safety as well as increased productivity as #1, 2, 3 & 4 key contributions for core business success (key added values). From the analysis of risk accountability, it appeared that assessment of FM value is mainly based on costs, risk management and customer satisfaction.

Topic 4: Asset FM Technology For Risk Management and Continuous Improvement

Technology plays a big role, Asset FM asked to install, implement, and work with a variety of technologies which include: BIM, BAS, CAFM and integrated workplace management system or IWMS that are FM tools. Proper selection and implementation of technology critical in determining current and future value of Asset FM services in organization.

Optimization of organizational value of FM technology occurs when tools facilitate processes that deliver organization mission proactively, expeditiously, productively and pre-emptive.

FM needs to adjust technology and processes well in advance of problem's visibility in order to address new requirements/ tools and techniques for customers. Proactively preparing facility for inhabitants' future needs requires trend analysis; business, manpower & skill set plus technology. New and future technology will facilitate task of achieving business objectives with leadership towards business vision.

The thrust is to have environment to which people fully conscious what need to be done if Asset FM degrading. Asset FM must be conscious about loss of quality and failure via AI and Risk analysis. Strict regimental discipline must be put in place and not just analysis of KPIs via leveraging of technology to improve future quality of services.

Safety, Maintainability, Reliability, Availability (SMAR): system design attributes with significant impacts on sustainment or total Life Cycle Costs. The standard definition of reliability is probability of failures over a defined time interval, whereas SMAR defined as percentage of time system considered ready to use when tasked.

Maintainability is a measure of ease and rapidity with whic system/equipment restored without any heavy loss of critical asset including life or major public inconvenience.

Trainer's Profile

Dr. Kang Kok Hin
(Managing Director, MPF Consultants Pte Ltd)

Dr. Kang earned his 1st class honors B. Eng (Mechanical Engineering) from Monash University of Australia. He also obtained his MBA, Master of Engineering degree and Doctor of Philosophy in Building Science from NUS.

Professionally Dr. Kang is a Chartered Engineer in Australia and UK, Professional Engineer in Singapore; Corporate members of IFMA (USA)/BIFM (UK) in Facilities and Project management. He is a corporate member of ASHRAE (USA); ASME (USA); Fellow of Institute of Plant Engineers UK and Fellow of Asian Concrete Institute of Singapore. He founded the Institution of Facilities Management (IFM), Singapore and is currently its Honorary President. He sits in the "Spring Singapore Technical Committee" for Building and Maintenance Services as Committee Member. He also assisted Singapore Test Services in the R&D of advanced project management training.

Dr. Kang is an Adjunct A/P, School of MAE Faculty, NTU; an concurrent Adjunct A/P of University Of Manchester UK for MSc (Project Management) 2017. He was also Adjunct A/P in 2010 – 2012 for the School of Facilities and Events Management/SUSS, and Chairman of the Program Advisory Committee (2010-2012).

He started as a design and maintenance engineer with Singapore Public Works Department where he garnered the expertise in building design, operation and sustainable facilities/Infra-structure management, strategic project management with his 30 over years of experiences in General and International business Management & international FM; in the capacities of General Manager of IT Park Bangalore India; and Director of Wuxi Industrial Park China etc.; plus General Manager of CDL's 100% owned subsidiary company CBM etc.

For industry participation, he lectures in Singapore Building Construction Authority (BCA) & BCA Academy on Green Mark FM certification, Construction Management productivity, Sustainable FM, Project Design/Planning/Control and FM Solutions. He also sits in the BCA Academy BIM-FM Steering Committee.

He has had several academic exchanges of Asset and Energy management with several Chinese universities and Industrial Parks, Retail malls, office/commercial, Institutions and industrial buildings on the importance of becoming green via the integration of data analytic, integrated maintenance planning with Artificial Intelligence, innovative technologies such as BIM-FM, strategic and sustainable FM approaches. He has also been reaching out to Institution of Engineer Malaysia and IKRAM (Malaysia Public Works Department).