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Facility Maintenance and Operations Committee (FMOC)

FMOC Webinar

on

Design for Maintainability: The Importance of operations and maintenance considerations during the design phase of construction projects

Presenter: Darrell Rounds

September 14, 2018

About FMOC

The FMOC works within the industry to improve the performance and longevity of buildings and building systems through consistent, effective and proper facility maintenance and operation. The committee provides industry-wide, public and private support for the creation of high-quality facilities through improved maintenance and operation and real property management. It promotes the sharing and integration of procedures and disseminates best practices. FMOC also actively provides feedback on a number of National Institute of Building Sciences programs and interacts with outside agencies to improve facility maintenance.

Contact: Jiqiu (JQ) Yuan, PE, PhD, PMP, jyuan@nibs.org

https://www.nibs.org/page/fmoc

Presenter: Darrell Rounds

With over 20 years of experience in Facilities Maintenance and Operations Management, Darrell Rounds is currently a Technical Group Manager for the Global Facilities organization at General Motors. His duties entail maintaining the technical oversight for facilities operations at 16 manufacturing operations totaling 52 Million Square Feet, and containing assets with a total replacement value of approximately $7.5 B (USD). Previously, he lead the Facilities Maintenance, Industrial Cleaning and Asset Sustainment activity for GM where he and his team of engineers were responsible for prioritizing facilities asset sustainment initiatives, problem solving, and disseminating facilities maintenance best practices across GM's vast portfolio. This included the procurement and management of industrial cleaning services for GM's North American Portfolio. Darrell has a Bachelor of Science Degree in Electrical Engineering from Michigan State University and a Master of Science Degree in Construction Management from Eastern Michigan University. He is the former chair of the Facilities Maintenance and Operations Committee of the National Institute of Building Sciences in Washington, D.C and now sits on its Board of Directors. He is a member of the ProFMI Commission, a governance body that serves as an advisory committee for the Professional Facility Management Institute™ (ProFMI™). He also carries the designations of Facilities Management Administrator (FMA®) from BOMI International and Certified Energy Manager (C.E.M.) from the Association of Energy Engineers.

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Future FMOC Webinar:

October 5 (Friday), 2018, 12-1 pm ET

Transitioning a New Facility from Construction to Operations and Asset Management

Presenter: Casey Martin

DESIGN FOR MAINTAINABILITY:

O&M Considerations in Building Design and Construction

Darrell X. Rounds, FMA®, C.E.M.
Manager, General Motors Company

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What will be covered

- Building Life Cycle Costs
- Defining Maintainability
- Why Implement Design for Maintainability (DfM)?
- Approaches to Implementing DfM
- Attributes of a successful DfM program
- Methodology for implementing DfM

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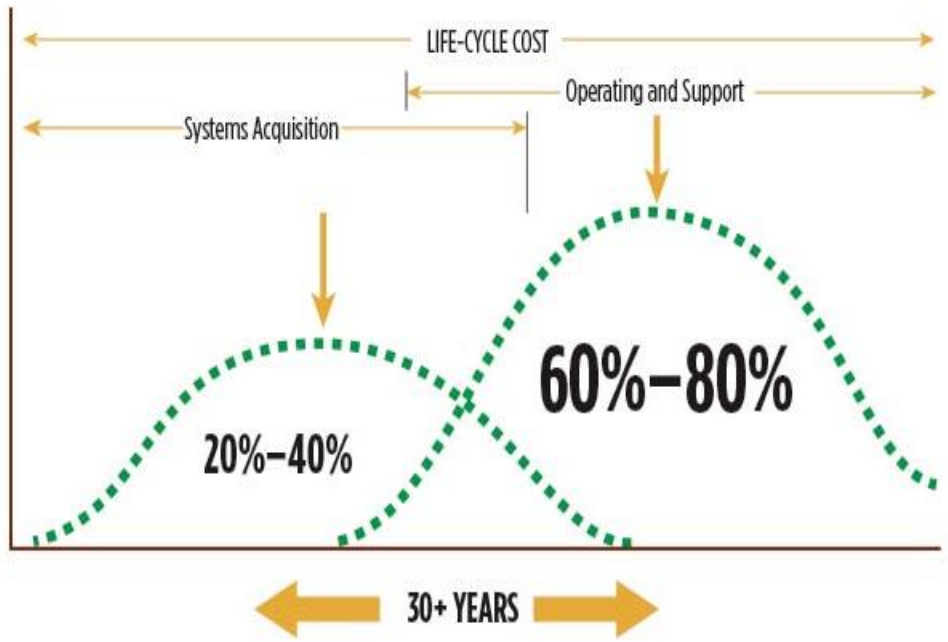
Building Life Cycle Costs

- There are numerous costs associated with acquiring, operating, maintaining, and disposing of a building or building system.
- Building-related costs usually fall into the following categories:
  - Initial Costs (e.g. Purchase, Acquisition, Construction costs)
  - Fuel Costs
  - Operation, Maintenance, and Repair Costs
  - Demolition and Disposal Costs
  - Replacement Costs
  - Residual Values (e.g. Resale or salvage Values or Disposal Costs
  - Finance Charges (e.g. Mortgage Payments)
  - Non-Monetary Benefits or Costs

Life Cycle Costs

- Studies show that operation and maintenance (O&M) costs are greater than three times the cost of initial construction
- O&M costs can equate to 60% to 80% of all life cycle costs
- Hence, the impetus to optimize O&M as early as possible



Credit: Defense Acquisition University website

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Maintainability Defined

- Maintainability is considered as inherent to the system design, regarding the ease, accuracy, safety, and economy of maintenance tasks.

- The purpose of maintainability is to improve effectiveness and efficiency of maintenance.

- ***Design for Maintainability (DfM) is the first step of an effective maintenance program, linking maintenance goals and desired outcomes to the design process.***

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Why DfM?

- Design for Maintainability emphasizes the importance of timely integration of design and construction knowledge with operations and maintenance (O&M) experiences into project designs at an early stage.

- Implementing DfM decreases the risk of
  - Reliability and Uptime being impacted
  - Total Life Cycle Costs increasing significantly
  - Inability of building use as originally intended

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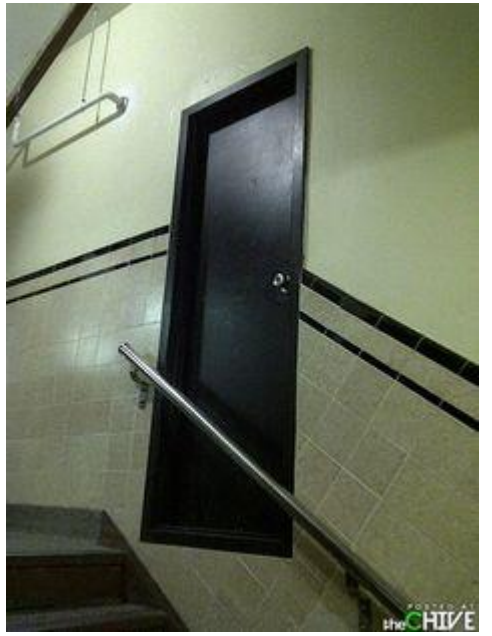
HOW DID THIS HAPPEN?



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Approaches to implement DfM

Two basic approaches are available to implement Design for Maintainability (DfM):

1. **The Stand-Alone process**
2. **The Combined process**

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The Stand-Alone Maintainability Process

- **The stand-alone maintainability process** is specifically focused on achieving project maintainability goals.
- Resources and procedures are ***dedicated solely*** to implementing appropriate levels of maintainability on the project.

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The Combined Maintainability Process

- Using **the combined maintainability process**, maintainability implementation is combined with other project improvement initiatives
  - Reliability improvement
  - Constructability analyses
  - Value Engineering
  - Process hazard analysis
- In essence, we look for improvements for maintainability in all methods for improving our construction outcome

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Considerations for the two approaches to DfM:

- **Standard Design Practice** – Maintainability is accomplished through designed-in features such as equipment accessibility, standardization, modularization, ease of maintenance, etc.
- **Contract Specifications** – Effective specifications include maintainability objectives, thorough operation and maintenance documentation and training needs, and maintenance management system requirements.
- **Cross-Functional Involvement** – Input from maintenance personnel is incorporated into the maintainability planning and design of the project.
- **Pilot Maintainability Program** – Small-scale program identifies benefits and costs of maintainability that can be tested with minimal risk.

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Considerations for the two approaches to DfM:

- **Integration into Existing Programs** – This approach identifies maintainability best practices that can be integrated into existing programs such as reliability analysis, process hazard analysis, and front-end planning with minimal cost and effort.
- **Formal Maintainability Program** – Developed, supported, and resources committed from the corporate level of the organization. Maintainability roles and responsibilities are clearly identified. A structured work process is provided to facilitate implementation of maintainability.
- **Comprehensive Tracking** – Methods exist to capture, document, archive, and share project maintainability lessons learned.

Attributes of a successful DfM program:

- **Corporate Commitment** – Setting aside resources to establish the maintainability program, development of a policy statement establishing the maintainability program, and designating a corporate-level champion to oversee the program.
- **Program Support** – Having a dedicated corporate and project staff to implement the program and to develop written procedures, track progress, and develop and maintain a maintainability lessons learned database.
- **Maintainability Planning** – Having work processes that review lessons learned, establish project maintainability objectives, and activity and resource planning to integrate maintainability into the project.

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Attributes of a successful DfM program:

- **Maintainability Implementation** – Demonstrated by project cross functional teams including maintenance staff, project meetings dedicated to maintainability, and specific project design reviews for maintainability.
- **Program Updating** – Demonstrated by continuous program evaluation, updated maintainability lessons learned, and integration of innovative maintenance technologies into the project design.

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Implementing DfM

- **Commit to Implementing Maintainability** – Supported by developing management awareness of maintainability, performing a self-assessment and defining barriers, recognizing the benefits, and developing an implementation plan.
- **Establish Maintainability Program** – Supported by identifying a corporate maintainability champion, developing corporate procedures and staff, and developing a lessons learned database.
- **Obtain Maintainability Capabilities** – Supported by establishing project level maintainability responsibility, orienting project team, and developing resources for project maintainability reviews.

Implementing DfM

- **Plan Maintainability Implementation** – Supported by forming cross-functional teams, defining maintenance strategies project maintainability objectives, and integrating appropriate maintenance technology.
- **Implement Maintainability** – Supported by conducting formal maintainability meetings, applying maintainability concepts in design and procurement, recognizing construction impact on maintainability, monitoring and evaluating program effectiveness, and conducting maintenance training and providing documentation
- **Update Maintainability Program** – Supported by evaluating the corporate program effectiveness, revising program organization and procedures, and updating the lessons learned database.

Sources and Supporting Information

www.construction-institute.org

- CII Document 142-1 – Design for Maintainability Research Summary

- CII Document 142-2 – Implementation Resource: Design for Maintainability Guidebook

- CII Document 142-11 - A MODEL PROCESS FOR MAINTAINABILITY IMPLEMENTATION

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QUESTIONS?

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Darrell X. Rounds, FMA®, C.E.M.
Manager, Electrical and Mechanical Systems
GM Sustainable Workplaces
General Motors Company

Email: darrell.rounds@gm.com
Phone: 248.343.9850

THANK YOU!!!

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