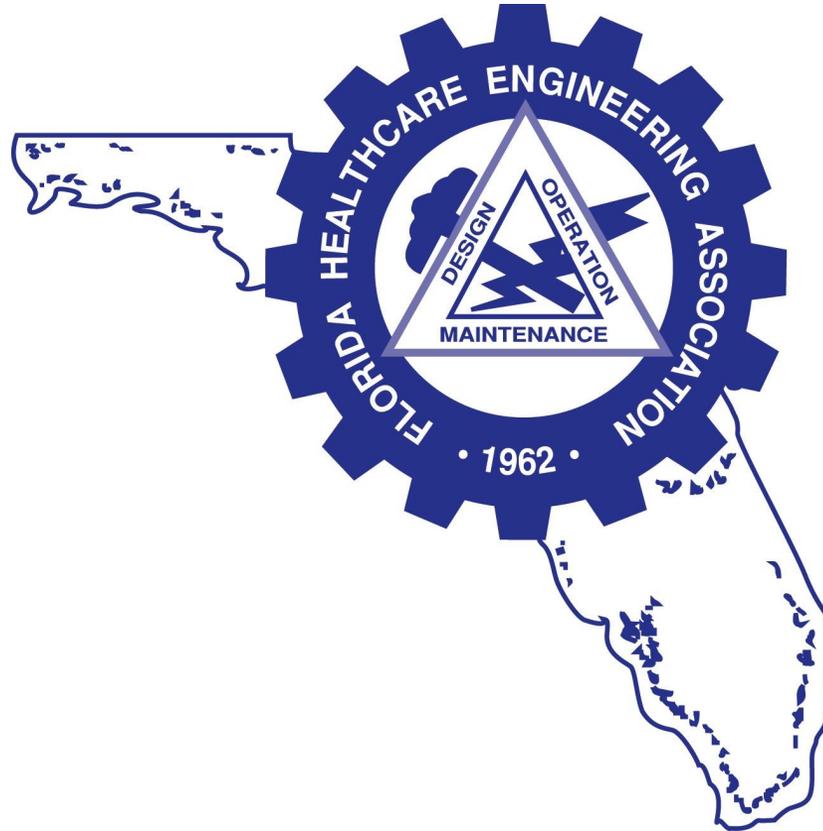


# The Facts About Classical Reliability-Centered Maintenance in Healthcare's Compliance Arena

FORUM RELIABILITY



# Introductions – Devin Hugie



- **FASHE (2018), CRL (2023)**
- **CHFM, CHC, CHSP-FSM, CHEP, CLSS-HC, CEPSS-HC, Six Sigma Green Belt**
- **Education:** BSBM & MBA, California Coast University
- **Volunteerism:** ASHE, CSHE, NFPA, IAHS
- **Veteran:** US Army
- **Experience:** Exec. Dir. Support Services, CHOC, Orange CA  
Dir. Fac. & Support Serv., Providence, Torrance & San Pedro CA
- **Personal:** Product of Southern California now relocated to Indiana. Married to the best woman on the planet and raising three great kids. Two adult children and two grandsons.



# Introductions – Brett Fisk



- **Certified Reliability Leader (2015) – Black Belt (2021)**
- **Category III Vibration Analyst (2005)**
- **Education:** BTh, The Way College of Emporia
- **Volunteerism:** ASHE – Author and Reviewer, ASHE Reliability-Centered Maintenance Guide, HFM Magazine  
AMP – CRL Domain Mastery Belt and Black Belt Programs, Author and Contributor
- **Veteran:** US Navy Nuclear Power Program
- **Experience:** ~50 years in Reliability & Physical Asset Management
- **Personal:** Married for 38 years, lived everywhere and settled in Texas. Three adult children, two grandchildren.



# Healthcare's History of Asset Reliability



# Agenda – Today

- Introductions
- Our History of Asset Reliability
- Landmarks on the Reliability Journey
- Classical Reliability-Centered Maintenance
- AEM Examples
- RCM Cases





# What is Reliability?

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An environment or condition in which assets and systems do what they have been designed and installed to do, when they are needed to do it, and in the manner required.

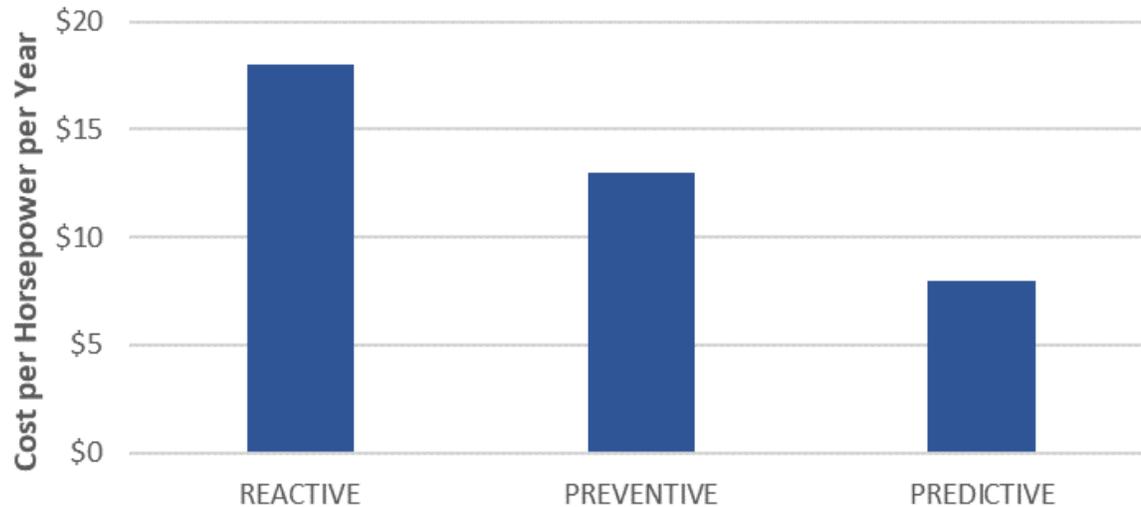


# Reliability First



# The Cost of Maintenance

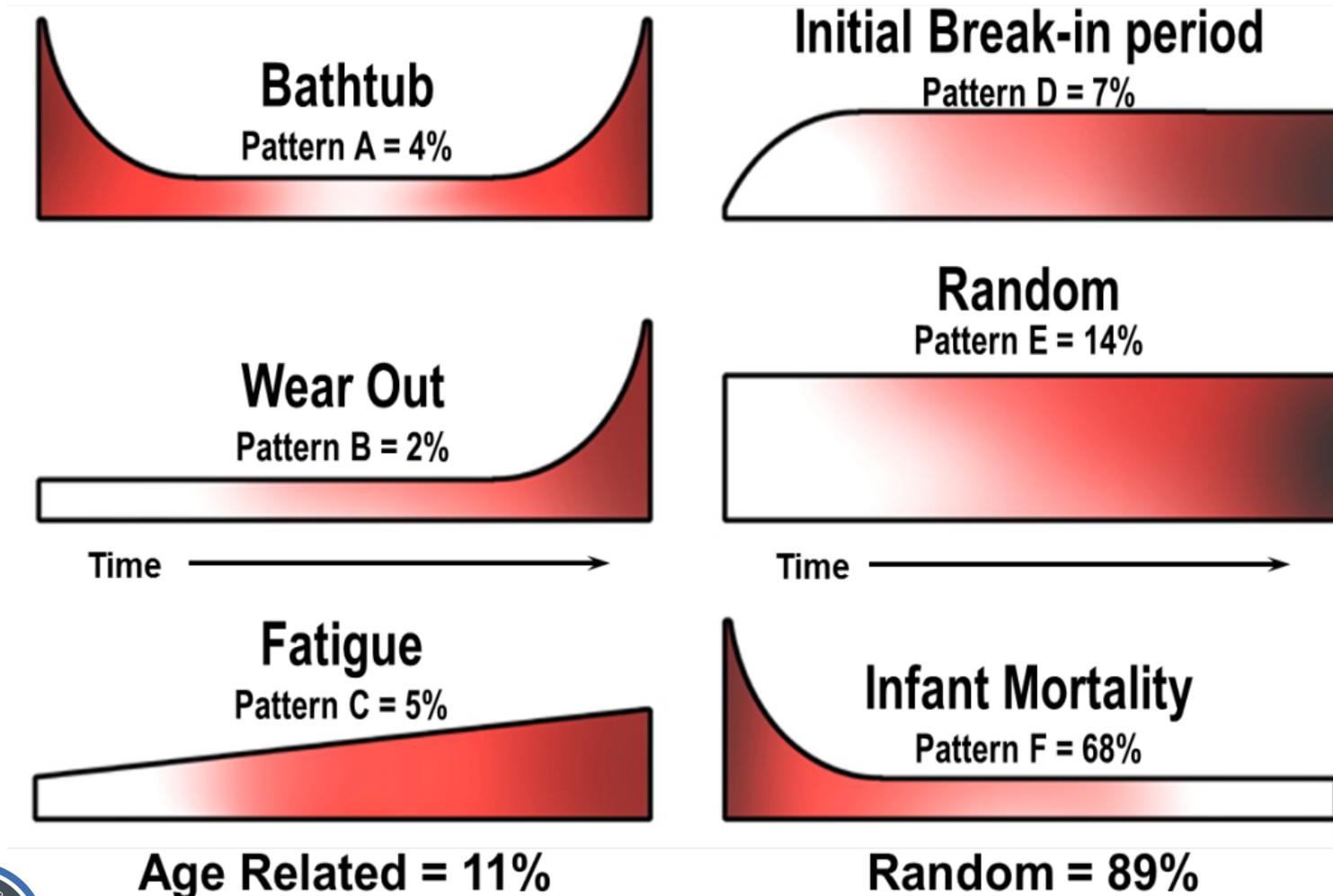
Maintenance Cost per Horsepower  
for General Rotating Equipment

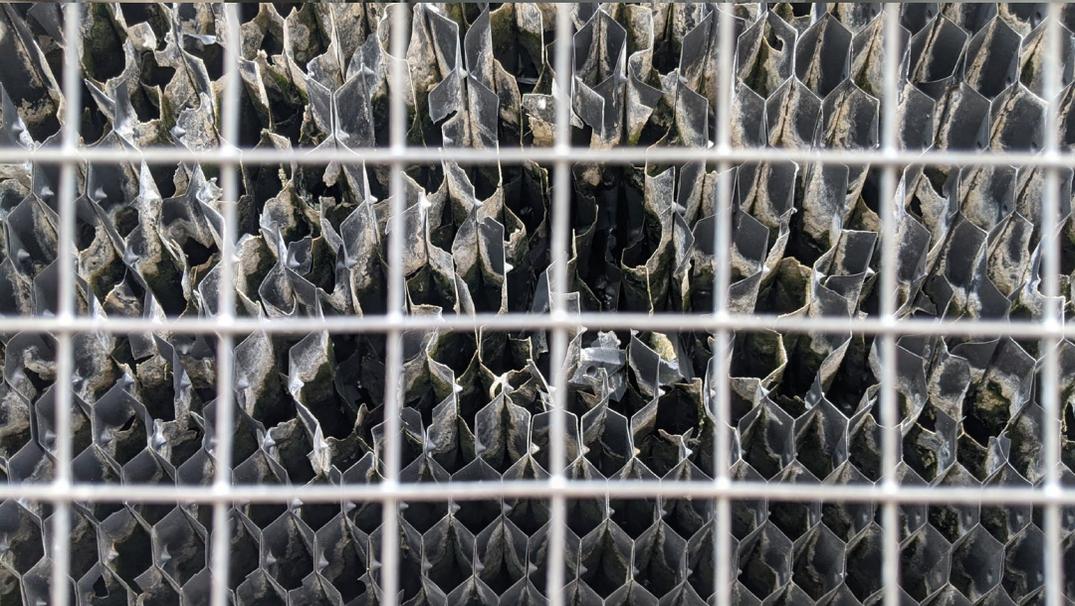


US Department of Energy, 2010

A properly balanced strategy costs 43% less than the more common Break/Fix practices.

# Maintenance and Failure Prevention





Maintain tower water chemistry.



Lubricate fan bearings monthly.



Check the operation of the fan on the variable frequency drive.



# What RCM Is NOT

Reliability-Centered Maintenance (RCM)  
is **NOT** maintenance.

RCM is not a **maintenance style**.

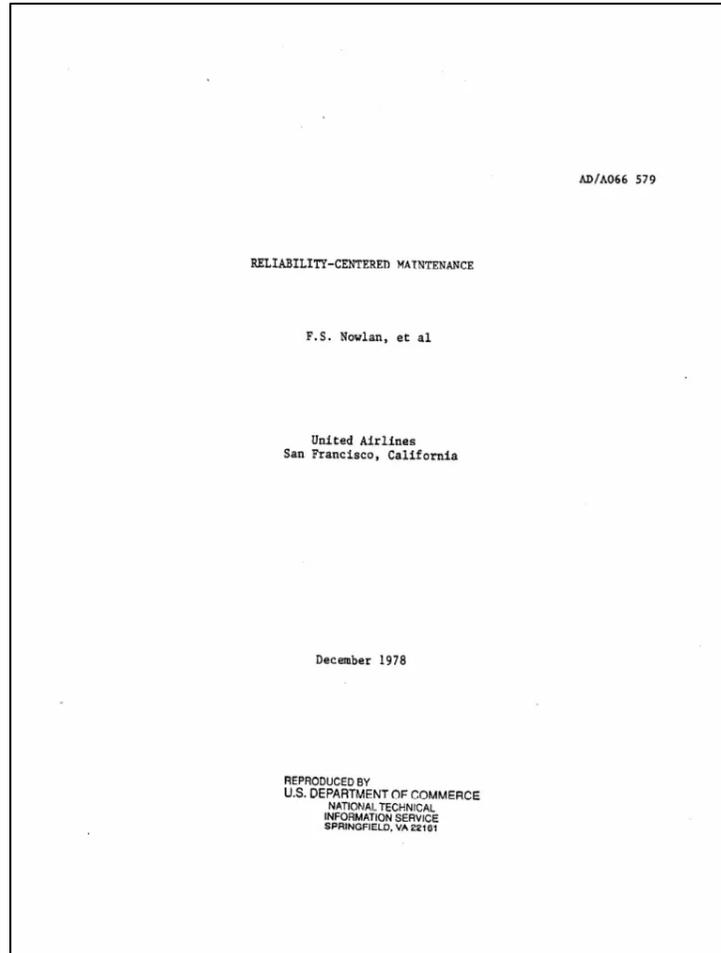
RCM is not a **maintenance strategy**.

RCM is not a **maintenance technology**.

RCM is not **new**.



# What Is Reliability-Centered Maintenance?



“The development of this program is towards the control of reliability through an analysis of the factors that affect reliability and provide a system of actions to improve low reliability levels when they exist.”

F. Stanley Nowlan & Howard F. Heap, *Reliability-Centered Maintenance*, 1978, p.4



# What Is Reliability-Centered Maintenance?

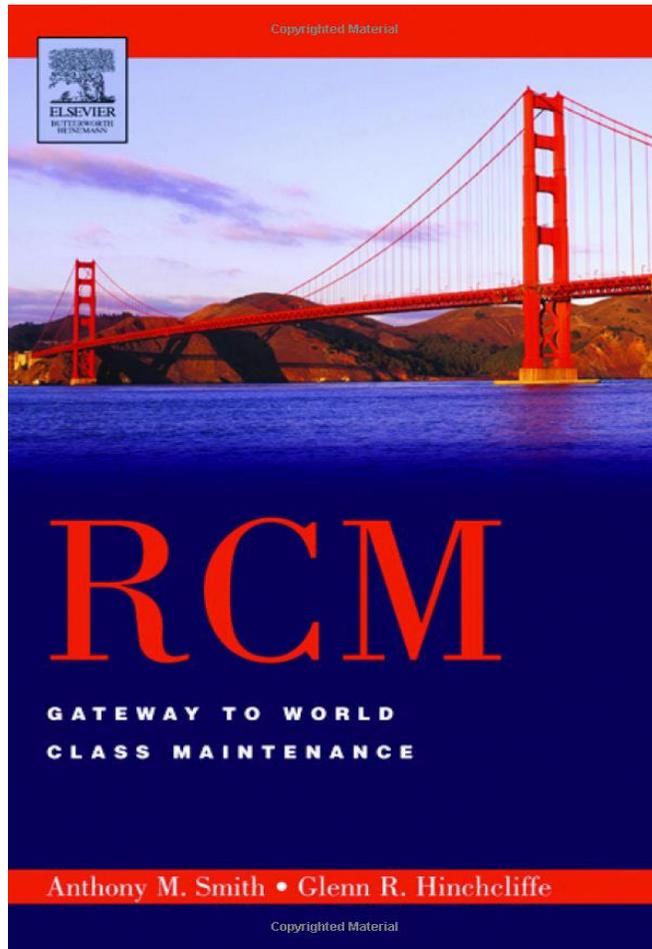


“Reliability-centered Maintenance: a process used to determine what must be done to ensure that any physical asset continues to do what its users want it to do in its present operating context.”

John Moubray, *Reliability-Centered Maintenance*, 2<sup>nd</sup> Edition, 1997



# What Is Reliability-Centered Maintenance?



“In summary, then, the RCM methodology is completely described in four unique features:

1. Preserve functions.
2. Identify failure modes that can defeat the functions.
3. Prioritize function need (via failure modes).
4. Select applicable and effective PM (planned maintenance) tasks for the high priority failure modes.”

Anthony (Mac) Smith, *RCM: Gateway to World Class Maintenance*, 2004



# What Is Reliability-Centered Maintenance?

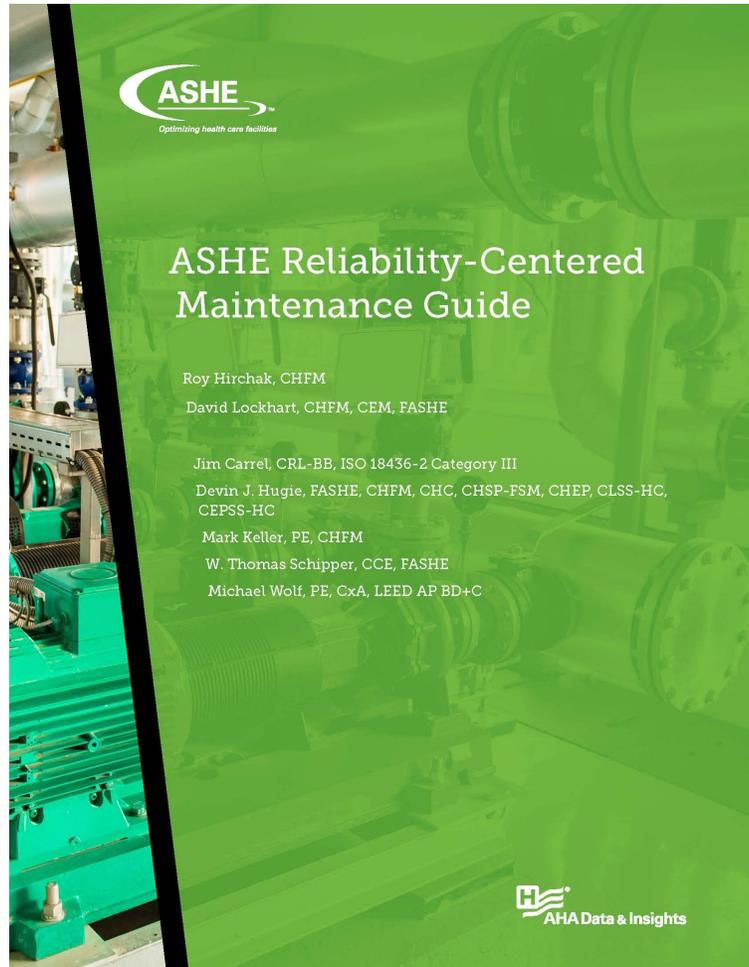


“Reliability-Centered Maintenance (RCM) determines the applicable and effective maintenance for each failure given the operational context of the equipment being assessed. The [analysis] technique can be described as a process to help people determine the best policies for managing the functions of physical assets and for managing the consequences of their failures.”

Victor Borges, [www.dnv.com](http://www.dnv.com), 2023



# What Is Reliability-Centered Maintenance?



“RCM is a decision-making process that analyzes the structures, systems, and assets (SSA), defines its true design function..., and determines the risk and/or criticality of the SSA to the organization and the operation of the facility.”

*ASHE Reliability-Centered Maintenance Guide, 2022*



# What About Compliance?



# Definitions



## “Utility Systems

Building systems that provide support to the environment of care, including electrical distribution and emergency power; vertical and horizontal transport; heating, ventilating, and air conditioning (HVAC); plumbing, boiler, and steam; piped gases; vacuum systems; and communications systems, including data exchange systems.”

CAMF Glossary (January 2024)



# Definitions



## “Maintenance

There are five types of maintenance – predictive, metered, corrective, interval-based, and reliability-centered.”

CAMF Glossary (January 2024)



# Must Follow OEM Guidelines #1 of 2



“Equipment subject to federal or state law or Medicare Conditions of Participation in which inspecting, testing, and maintaining be in accordance with manufacturers’ recommendations, or otherwise establishes more stringent maintenance requirements.”

CAMH, EC.02.05.01 EP6 (January 2024)



# Must Follow OEM Guidelines #2 of 2



“New operating components with insufficient maintenance history to support the use of alternative maintenance strategies.”

CAMH, EC.02.05.01 EP6 (January 2024)

- Records provided by the hospital’s contractors
- Information made public by nationally recognized sources
- Records of the hospital’s experience over time



# AEM Written Justification Criteria



- How the equipment is used.
- Likely consequences of equipment failure
- Available redundancy
- Incident history of identical or similar equipment
- Maintenance requirements

CAMH, EC.02.05.01 EP7 (January 2024)



# AEM Written Justification Criteria



“The hospital identifies operating components of utility systems on its inventory that are included in an alternative equipment maintenance program.”

CAMH, EC.02.05.01 EP8 (January 2024)



# RCM: The Seven Basic Questions

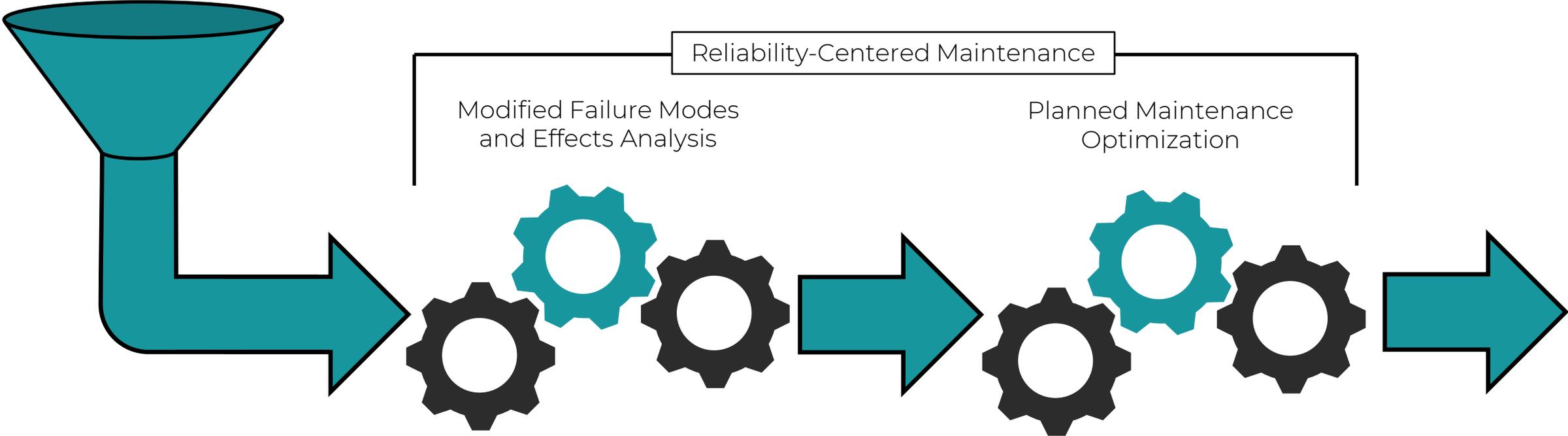
1. What are the functions and associated performance standards of the asset in its present operating context?
2. In what ways does it fail to fulfill its functions?
3. What causes each functional failure?
4. What happens when each failure occurs?
5. In what ways does each failure matter?
6. What can be done to predict or prevent each failure?
7. What should be done if a suitable proactive task cannot be found?

(Reliability-centered Maintenance II, 2<sup>nd</sup> Edition, John Moubray, 1992. p.7)

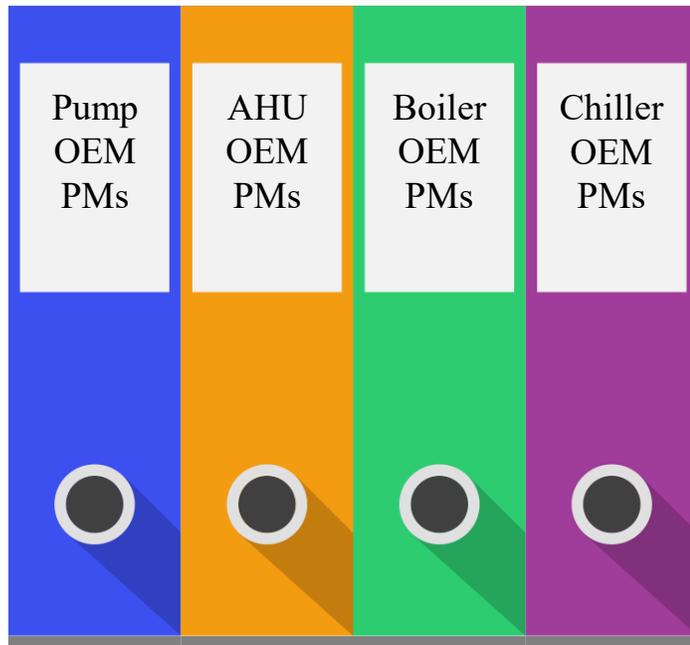


# Alternative Equipment Maintenance Plan

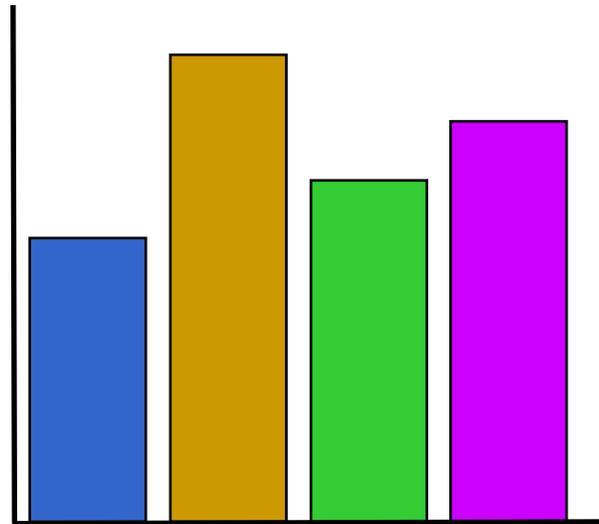
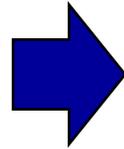
Critical and Life/Safety Assets



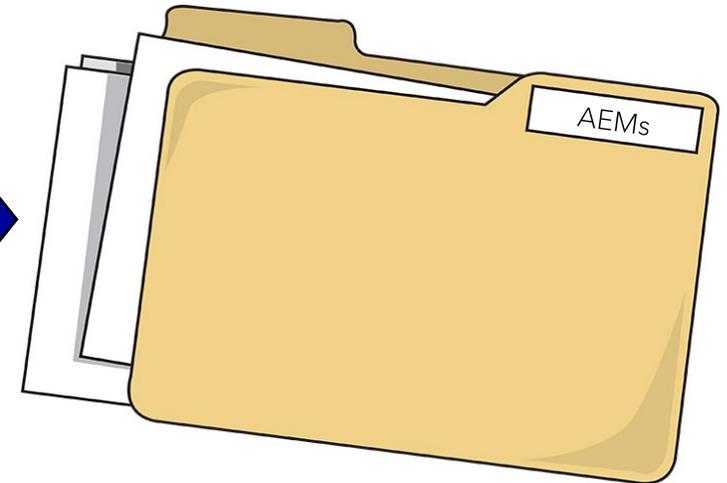
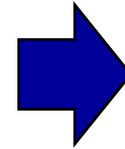
# Alternative Equipment Maintenance Plan



Original Equipment Manufacturer  
Preventive Maintenance Guidelines

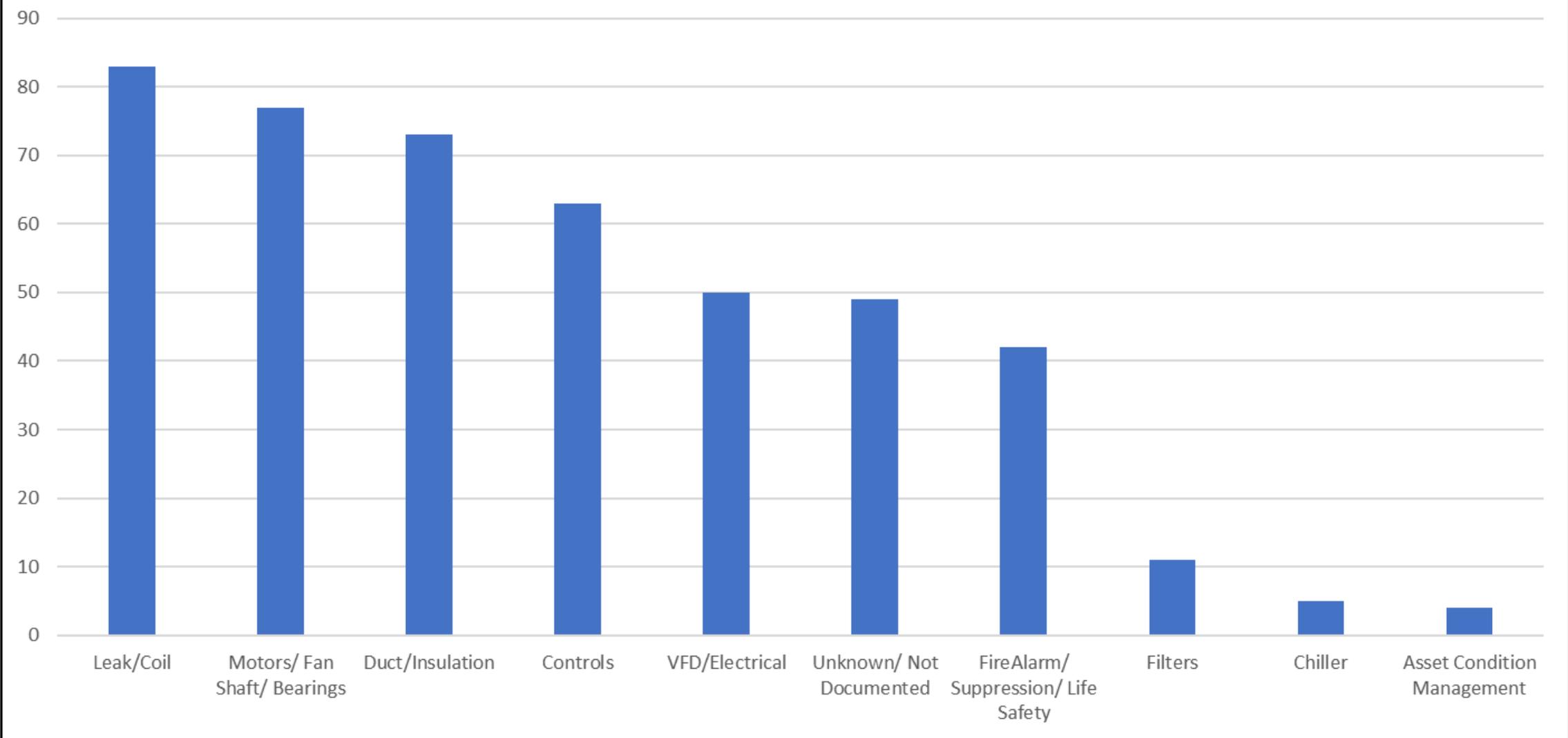


Reliability-Centered Maintenance Analyses

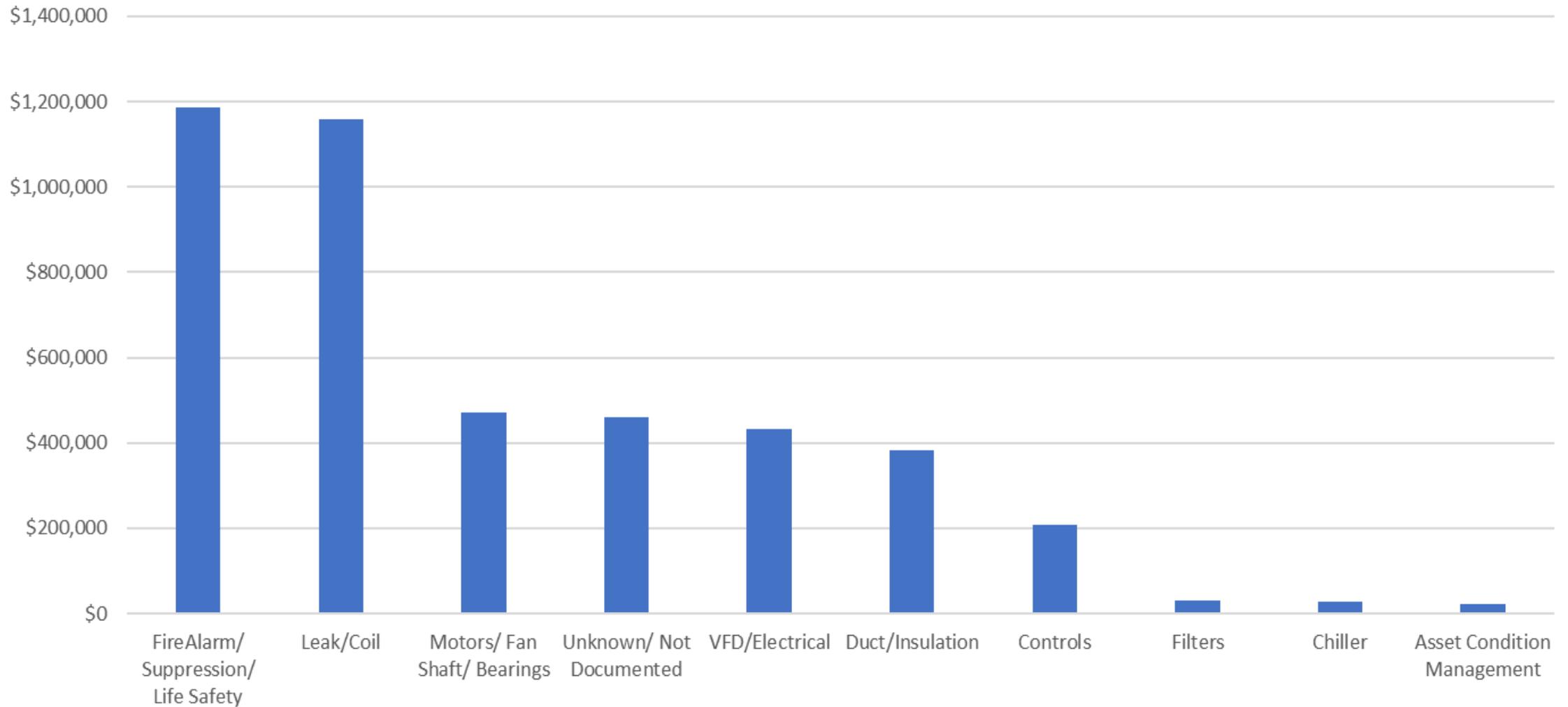


Alternative Equipment Maintenance Risk  
Assessments

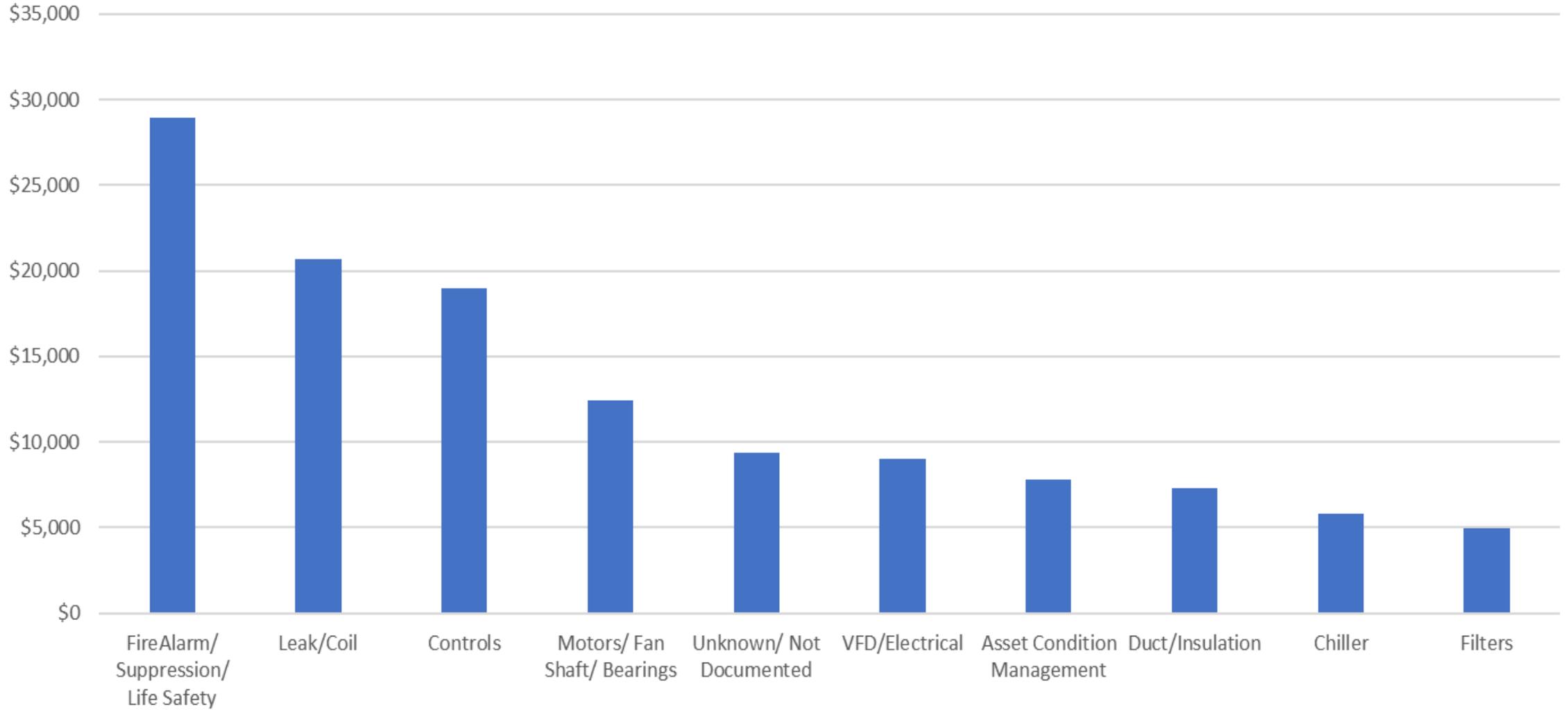
AHU Unplanned WO Count by Fault Type



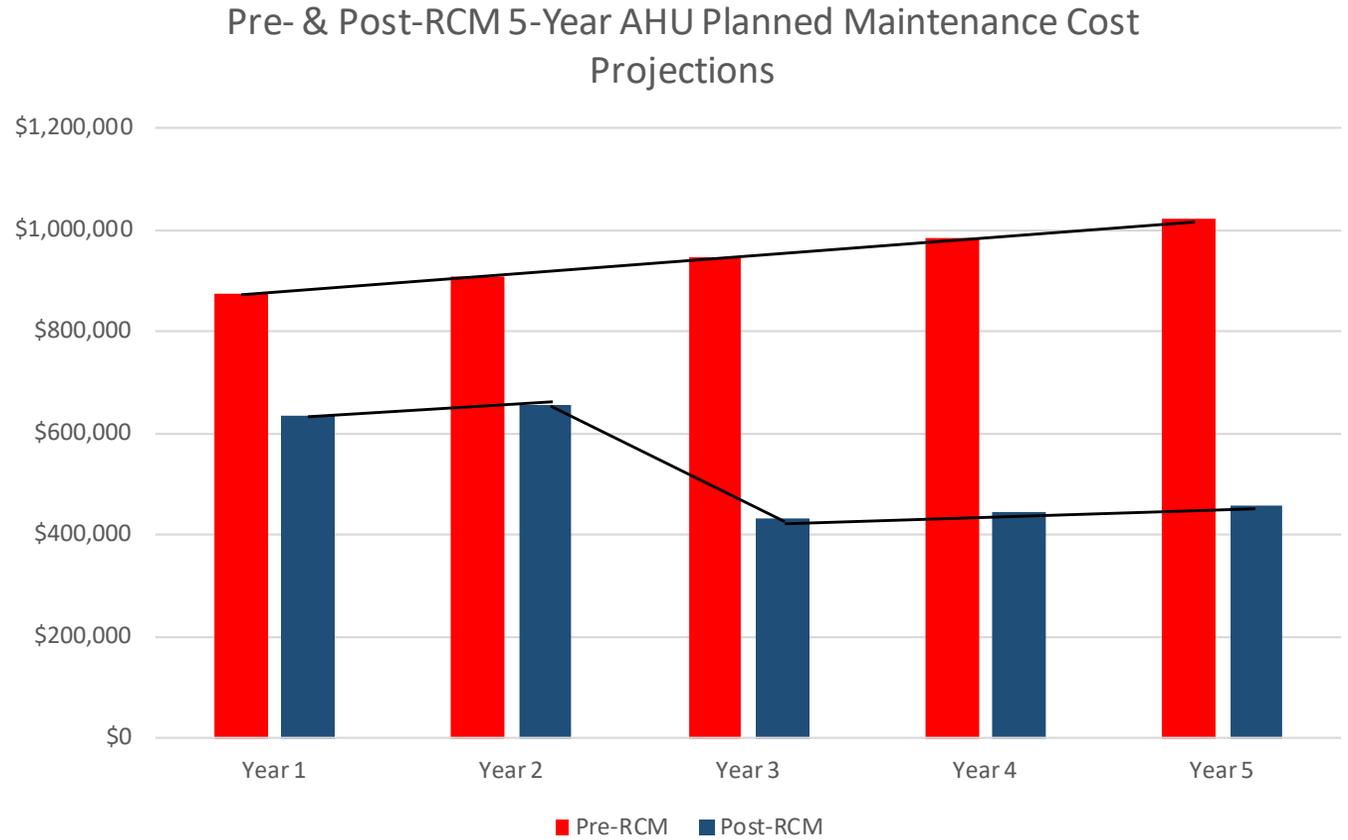
AHU Unplanned WO Cost by Fault Type - Vendor Cost



AHU Unplanned WO Average Cost Per WO Per Fault Type - Vendor Cost



Contract Year	Pre-RCM	Post-RCM
Year 1	\$873,616	\$634,290
Year 2	\$908,560	\$655,662
Year 3	\$944,902	\$430,975
Year 4	\$982,697	\$444,214
Year 5	\$1,022,003	\$457,983



## Pre-RCM Program

- 5-Year MSA
- **\$945K Annually in Year 3**
- HVAC AHU PM Provider
- FORUM Reliability (\$73,797.50 Development)

## Post-RCM Program

- New 5-Year MSAs (HVAC, CM, Forum)
- **\$634K Annually in Year 1 (Total)**
- HVAC AHU PM Provider (HVAC Provider)
- Condition Management (TBD + Forum)
- 3<sup>rd</sup> Party QA/QC Provider (Forum)
- 2-Year Sensor Installation (TBD + Forum)

# Just What the Doctor Ordered



Name: Healthcare

Date: January 2024

Begin a regimen of  
reliability and asset  
management.

Signature: Dr. CMS, MD

