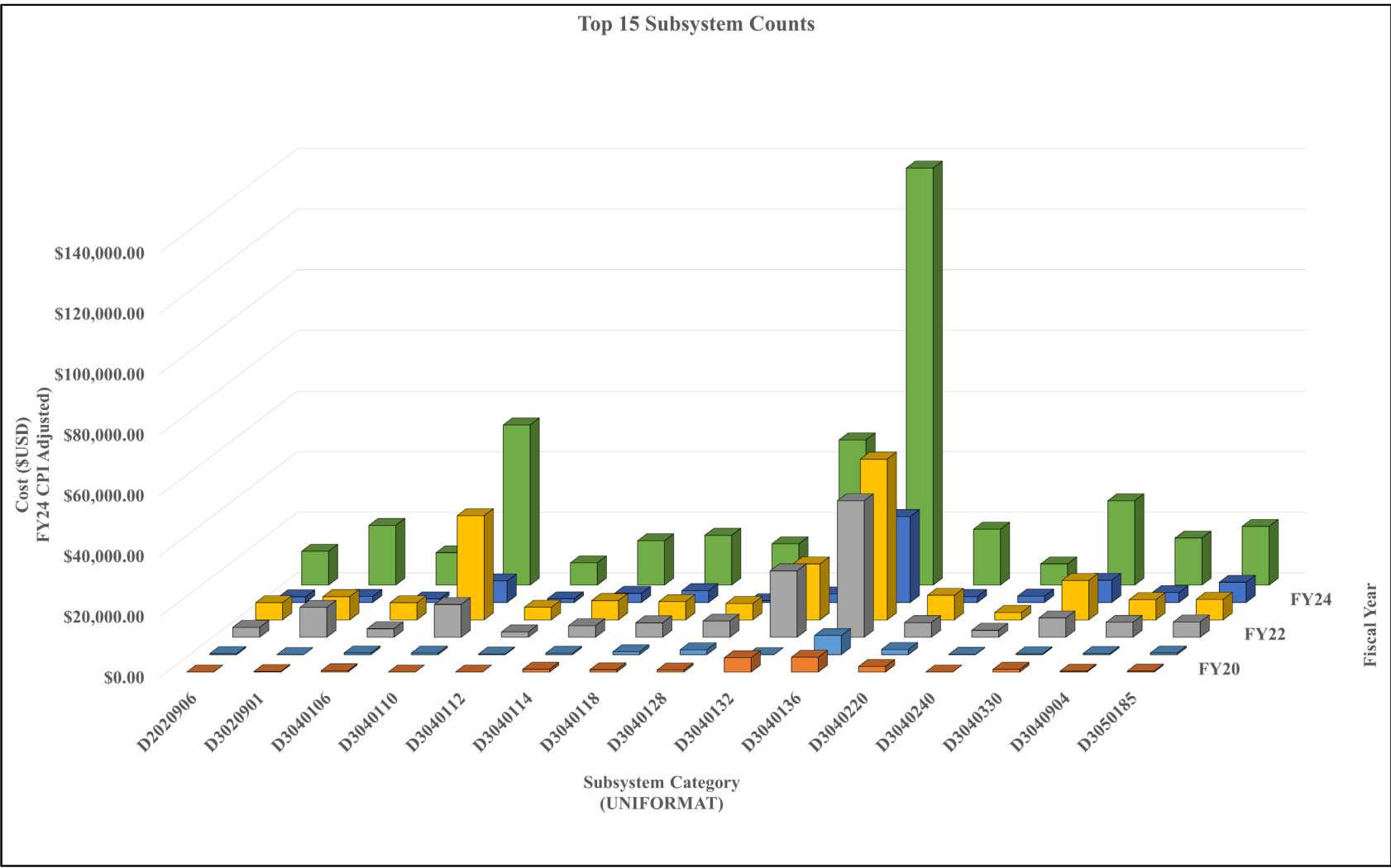


## Abstract

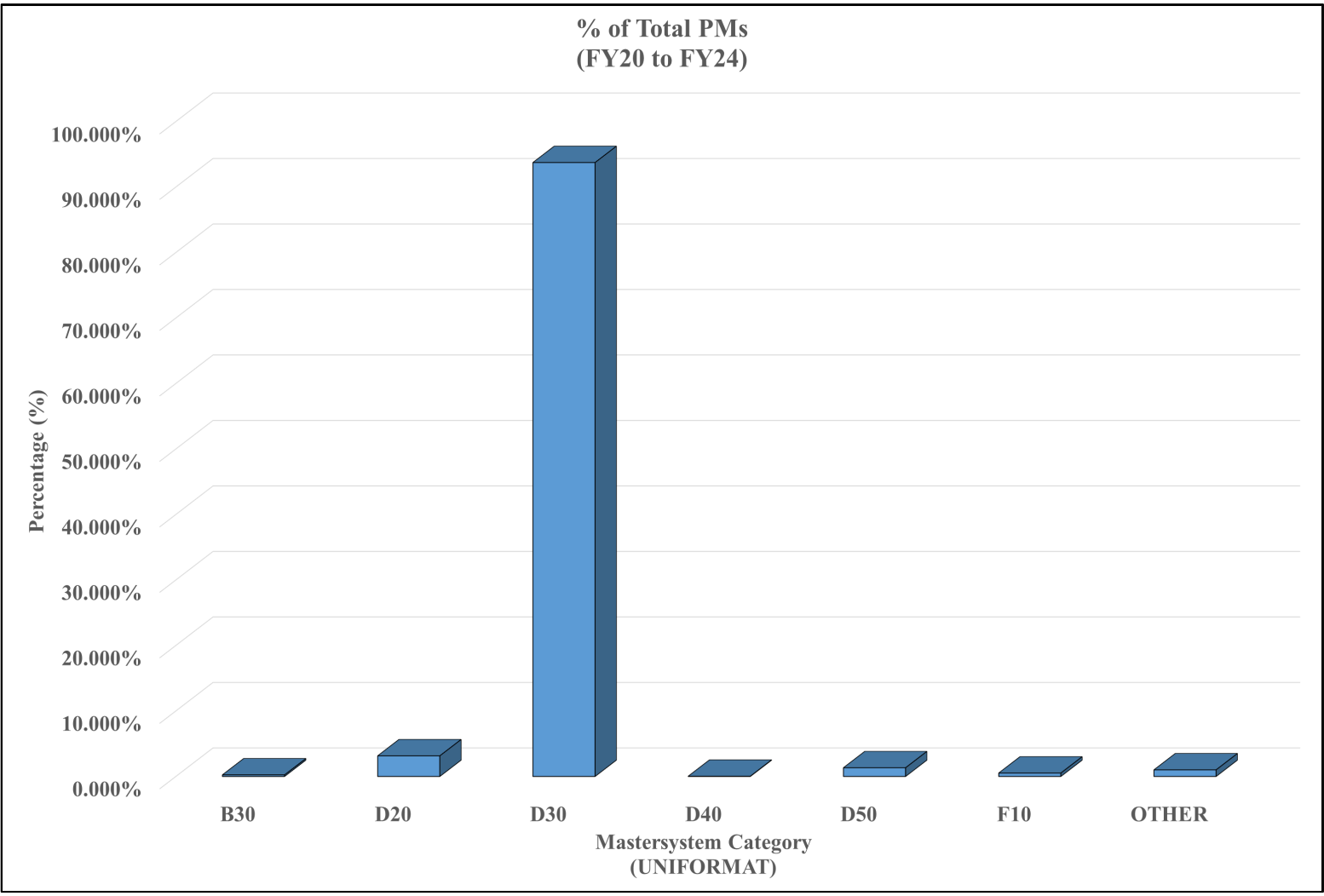
This study evaluates the cost-effectiveness and lifecycle performance of Naval Facility Engineering Systems Command’s (NAVFAC) standardized preventive maintenance (PM) plans compared to Original Equipment Manufacturer (OEM)-guided plans. Using data from over 7,152 PMs and 3,659 assets across nine Navy facilities (FY20–FY24) at the Washington Navy Yard (WNY) and Naval Support Activity (NSA) Dahlgren, the research integrates MAXIMO maintenance records, RS Means cost data, and Consumer Price Index (CPI) adjustments. Results show that while NAVFAC’s PM plans offer administrative efficiency and lower short-term costs, OEM-guided plans extend asset longevity—sometimes by nearly a decade. A hybrid PM strategy, applying OEM guidance to high-value assets and NAVFAC standards to low-risk systems, offers the best return on investment. Findings support data-driven updates to NAVFAC’s PM strategy and highlight the need for improved asset tracking, dynamic scheduling, and broader adoption of OEM-aligned practices for enhanced operational readiness and lifecycle cost savings.

## Methods

- Analyzed 7,152 preventive maintenance (PM) and work order records and 3,659 facility assets from FY20–FY24 across the WNY and NSA Dahlgren.
- Compared NAVFAC standard PMs vs. OEM-recommended frequencies using:
  - MAXIMO asset records (actual maintenance data)
  - RS Means costs (industry-standard cost estimation)
  - Consumer Price Index (to normalize historical costs to FY24 dollars)
  - UNIFORMAT codes for system classification.
- Applied lifecycle cost analysis and asset age vs. design life metrics to determine cost-efficiency and longevity outcomes.



LEGEND	
D2020906 - CIRCULATING PUMP	D3040132 - VAV TERMINAL
D3020901 - BOILER, CAST IRON, HT WTR, OIL	D3040136 - VAV TERMINAL, FAN POWERED
D3040106 - AIR HANDLING UNIT, FIELD FAB	D3040220 - FAN SYSTEM, CENTRIFUGAL
D3040110 - AIR HANDLING UNIT, CENTRAL STA	D3040240 - FAN SYSTEM, ROOF EXHAUST
D3040112 - AIR HANDLING UNIT, COMPUTER ROOM	D3040330 - CIRCULATING PUMP, END SUCTION
D3040114 - AIR HANDLING UNIT, ROOFTOP	D3040904 - SPLIT DUCTLESS SYSTEM, INDOOR UNIT
D3040118 - FAN COIL A/C, CAB MNT, TWO PIPE	D3050185 - COMPUTER ROOM COOLING UNITS
D3040128 - FAN COIL A/C, DUCT MOUNT, 4 PIPE	



LEGEND
B30 - ROOFING
D20 - PLUMBING
D30 - HVAC
D40 - FIRE PROTECTION
D50 - ELECTRICAL
F10 - SPECIAL CONSTRUCTION
OTHER

## Results & Impact

- NAVFAC PMs more cost-efficient (short-term) but did not appear to consistently extend asset life.
- A hybrid PM model yields the best ROI:
  - Use OEM PMs for high-value, aging, or mission-critical assets.
  - Retain NAVFAC PMs for low-risk systems.
- Data showed NAVFAC plans underperformed for some systems (e.g., chillers, compressors) where PM frequency was below OEM levels.
- Supports a shift toward dynamic, asset-specific PM strategies for cost savings and improved readiness.

## Future Research

- Expand the hybrid model pilot to additional NAVFAC regions.
- Develop a PM priority scoring system that considers:
  - Asset age relative to design life
  - PM vs. EUR (emergency, urgent, routine) work history
  - Frequency gaps with OEM standards
- Study longitudinal asset performance tied to maintenance plan types over 10+ years.
- Improve traceability of EURs within MAXIMO to support better root cause analysis.



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