



Shipboard Lighting Systems and Areas of Interest

Presented to:

**National Shipbuilders Research Program
Electrical Technologies Panel**

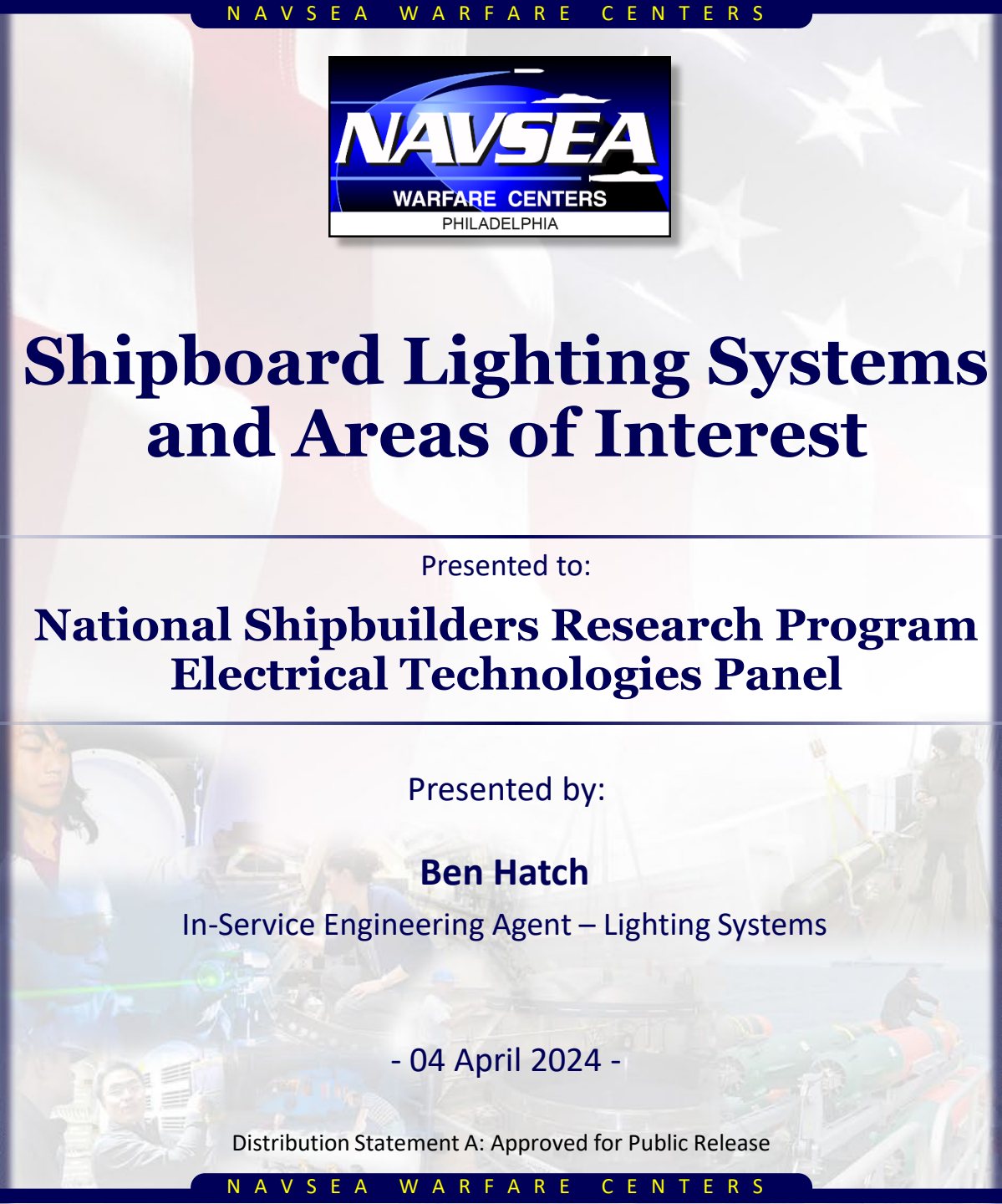
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Topics

- Sailor Information Sources
 - Where do they look, what do they miss, what doesn't exist
 - Where best to cover lighting equipment moving forward
- Photometric Calculations & Software
 - Where does software fit in moving forward
 - Can we standardize on information provided to government
- When do we replace LEDs?



Sailor Information Sources

- Direct fleet support by ISEA often results from ship's force not knowing where to find the information they need to repair their lighting equipment
- The available formal documents are not reviewed, inaccurate, or do not contain enough information in one location for quick repairs
- Evolution of lighting equipment and systems may make situation worse
 - Increased lifetimes reduce sailor familiarity with repair processes
 - Limited standardization from new technology



SIS Issues

- Ship Lighting Drawings
 - Revised throughout the new construction process, adding sheets and making applicability challenging for deckplate
 - Reference other drawings and documents sailor may not have on hand
- Ship Information Book
 - Almost never revised post delivery
 - Can split information across multiple books. LPD Example:
 - POWER AND LIGHTING SYSTEMS: GENERAL DESCRIPTION AND DESIGN INFORMATION OF SYSTEMS
 - POWER AND LIGHTING; ELECTRICAL EQUIPMENT AND ELECTRICALLY OPERATED AUXILIARIES



SIS Issues – cont.

- Naval Ships' Technical Manual (NSTM) Chapter 330 – Lighting
 - Generally not reviewed by sailors that are not assigned to specific lighting shops on larger platforms
 - Broadly covers entire Navy, specific systems not fully addressed
 - Lengthy review/update process
- Allowance Parts Lists (APLs)
 - References to drawings or manuals often missing
 - Part nomenclature doesn't align with common names
 - Quantity of lighting equipment makes ensuring accuracy challenging



SIS Issues – cont.

- Maintenance Requirement Card
 - Focused on maintaining equipment, not repairing
 - Distribution equipment covered by general, broad “open and inspect” cards while majority of fixtures lack MRCs completely
- Equipment labeling
 - May require internal access
 - New equipment not yet provisioned lacks NSN/NIIN and DLA nomenclature information
 - Painted over, falls out, generally unreliable



SIS – What to Deliver in the Future

- How do we ensure new lighting equipment is properly documented in the future?
- Example problem: New overhead LED lights incorporate DIP switches to allow for multiple outputs
 - Where are we documenting the DIP switches?
- Possibilities:
 - New lighting specific tech manual?
 - Amplified requirements for ship information books?
 - New lighting drawing separate from arrangement/one-lines?
 - Sort of a “List of Lamps” equivalent
 - Develop long term MRCs for lighting equipment and incorporate info into new MRC format



Photometric Calculations & Software

- Performing photometric calculations “by hand” as described in DOD-HDBK-289 and other documents is time consuming to perform
- Lighting calculation deliverable, usually a .pdf of tables of calculations, is generally not that helpful for government reviewers
- Lighting software offers different possibilities for presenting designs and calculated lighting levels
- Are shipyards incorporating it now, planning to in the future?
- Can we standardize outputs to be used as deliverables?



LEDs – When Do We Replace Them?

- If predicted lifetimes are achieved, what drives replacement of solid state light sources?
 - General time based
 - Active monitoring
 - Photometric surveys
 - Fix when “fail”
- New construction – how many hours have fixtures been in use prior to delivery?
- Can we build in margin – design for 50,000 hours, not zero