High Complexity Vessels & Naval

Joint Support Ship (JSS) “Karel Doorman”

Oceangoing Patrol Vessels (OPV) “Holland”

Antarctic Research Supply Vessel (ASRV) “Nuyina”

Fishery Research Vessel (FRV)
What do you get when you mix grey & green?
The Green Side

- Operational Energy Strategy
- Reduce dependency on fossil fuels
- 20% by 2030, 70% by 2050
- Navy, Army and Air Force

source: Rijksoverheid – Operationele Energie Strategie
The Grey Side

- high endurance
- high performance
- robust and reliable

source: marineschepen.nl
Reinvent the wheel?

source: Volvo T5 Twin Engine concept
Peeking over the fence

- car industry in the lead
- faster prototyping cycles
- customer driven vs. class driven

source: U.S. National Research Council (NRC) 2013
Current Efforts

- maneuvering/performance

- ice milling

- data driven model validation

source: Shaftsoftware/ShaftDesigner

- exhaust gasses are evident source of energy
- heat integration, central systems
- good combination with energy storage
- space & weight limitations
- peak shaving for highly varying hotel loads
- tactical usage (ultra-silent operation)
- challenging to combine with navy operational needs
- other uses: grid stability, instant boosting
Component Synergy

- one component, multiple roles
- prevent double installation of power
- can assist with redundancy needs, flexibility
- system control, not component control
focus on minimizing losses…

focus on optimizing the mix…

Outlook on Tooling

- acausal modeling methods
  - promotes system (domain) thinking
  - modularity and maintainability
- Modelica / SimScape
- Much a work in progress...
Closing Thoughts (from industry)

- What are the lessons learned from car industry and the future trends?
- What are the next big steps in the maritime industry to keep up?
- What do we need or expect to need from our (knowledge) suppliers?
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