New Norwegian icegoing reseach vessel

ERVO 2009

INSTITUTE OF MARINE RESEARCH
HAVFORSKNINGSINSTITUTTET

First and only Norwegian purpose built icegoing research vessel

Feasibility study

- Develop a proposal for a replacement vessel for ”Lance” and ”Jan Mayen”

Background

Renewal-plan for Norwegian RVs, dated March 2006

Proposal for an icegoing RV, dated Juni 2007

Parliament funding for feasibility study, December 2007

Proposed vessel

LOA: 100m, LPP: 84.8m, Beam: 20.0m, Draught: 7.6m


Rolls-Royce
NVC-Design
NVC 395 POLAR


Rolls-Royce
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NVC 395 POLAR
SHIP NAME
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Organization

- Steering Committee:
  - Ministry of Fisheries- and Coastal Affairs,
  - Ministry of Environment
  - Ministry of Science and Education
  - Ministry of Foreign Affairs
  - Ministry of Oil and Energy
- User Committee

  Institute of Marine Research, Polar Institute, University of Oslo, Bergen, Tromsø and Svalbard, Defence Research Establishment and Oil Directorate
- Project Organisation

  Institute of Marine Research (Project Manager and staff) and Polar Institute (Deputy Program Manager)

Project plan (optimistic)

- 2008: Concept definition, technical specifications
- 2009: Model testing, prequalification of yards, call for tenders, contract negotiations
- Early 2010: Contract
- Late 2011: Delivery of vessel
- Spring 2012: Trials/Setting to work
- Summer 2012: First regular science cruise

Vessel Concept

- Multifunctional
  (biology, oceanography, geology)
- Icebreaker (POLAR 10 ICEBREAKER)
- Helicopter carrier
- Logistics vessel
- Training and education
- Endurance
- Clean ship

NVC 395 POLAR

100 m ISGÅENDE FORSKNINGSFARTØY

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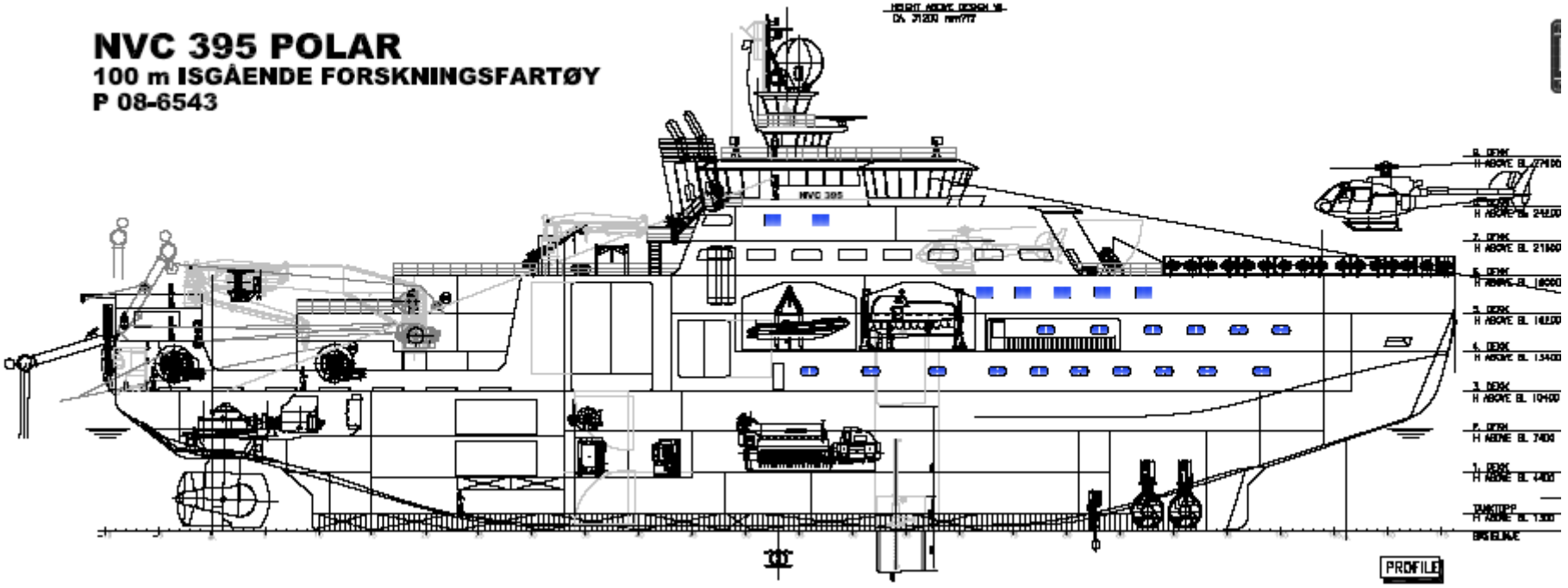


Hull and propulsion

- DNV Polar 10 ICEBREAKER

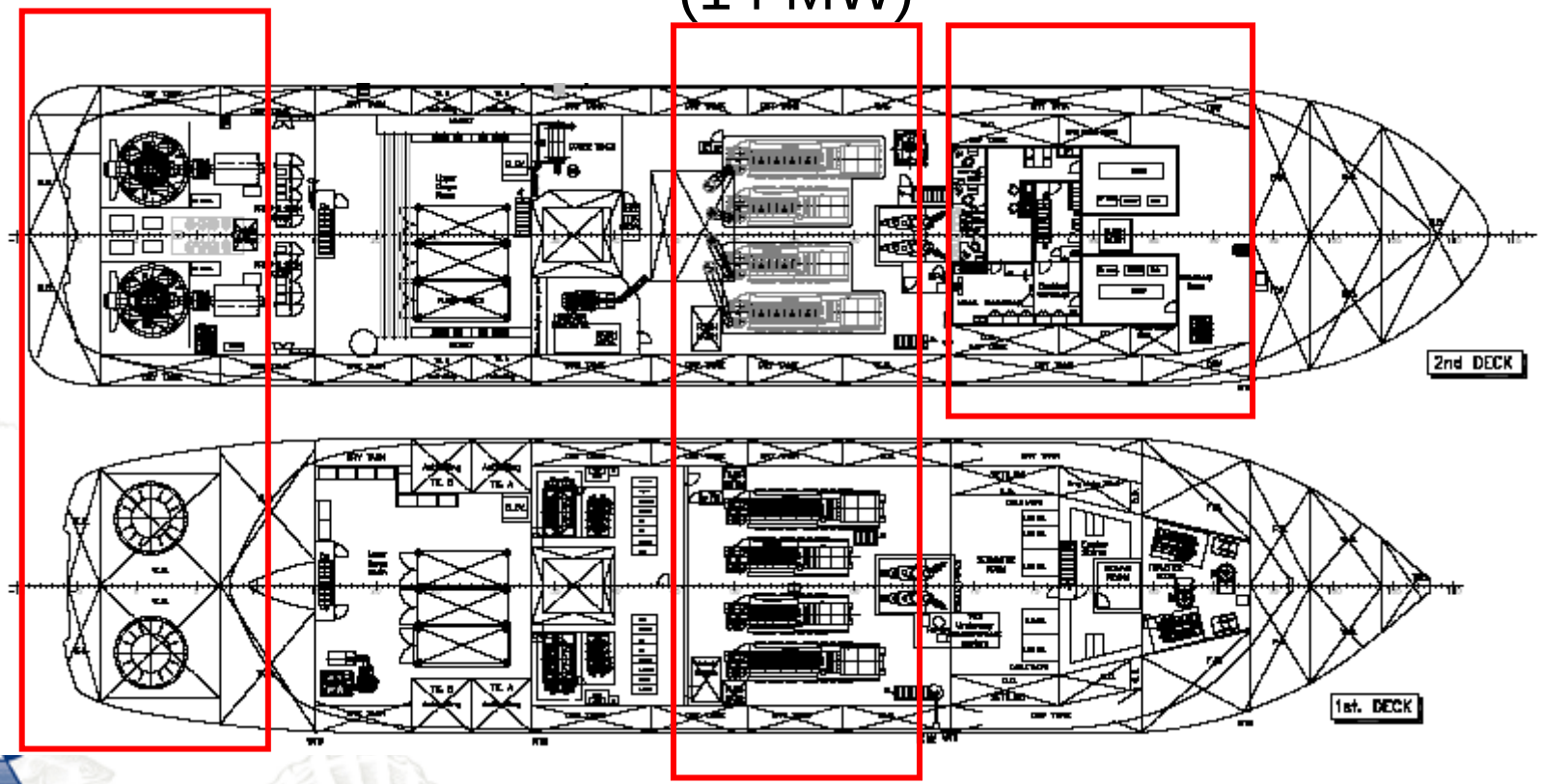
  (POLAR 10 definition: Vessels intended for ice breaking, built for another main purpose. Ice conditions: Winter ice with multi-year ice-floes and glacial ice inclusions.Figures indicate nominal ice thickness in dm.)
- Propultion system: Diesel-electric machinery (AC) and ”Z-drive” propulsion system. Two tunnel thrusters in the bow area for dynamic positioning (DP) operations.

Propulsion system

Z-drives (Aquamaster US Arc 0.8)

Diesels (14 MW)

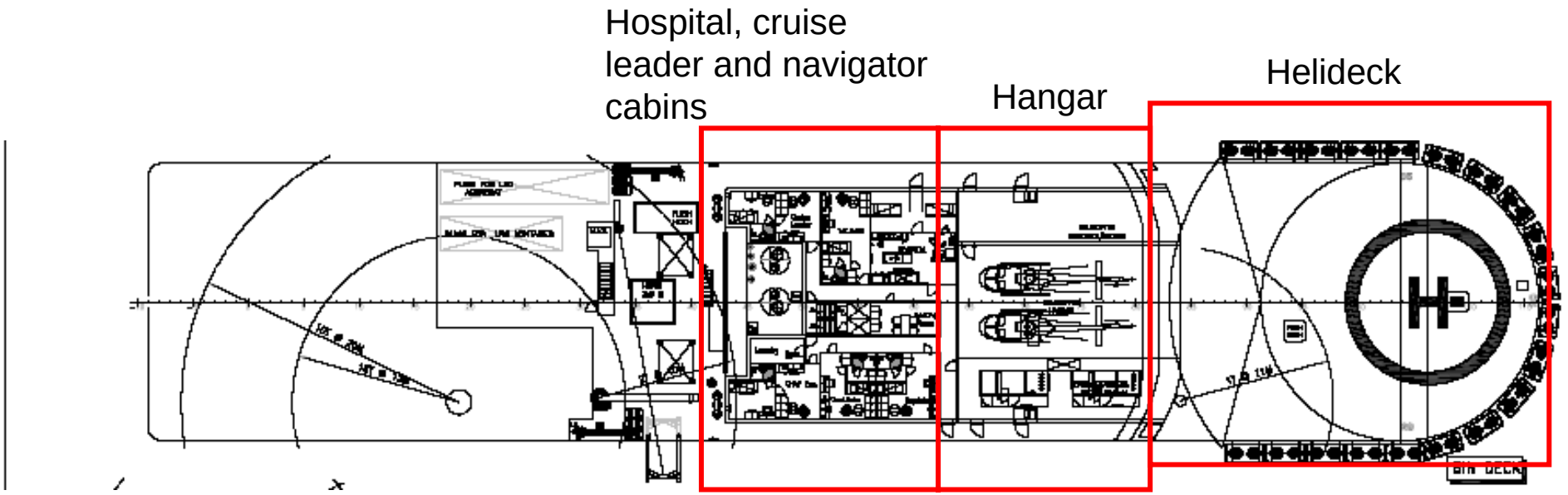
MCR



KOPRI

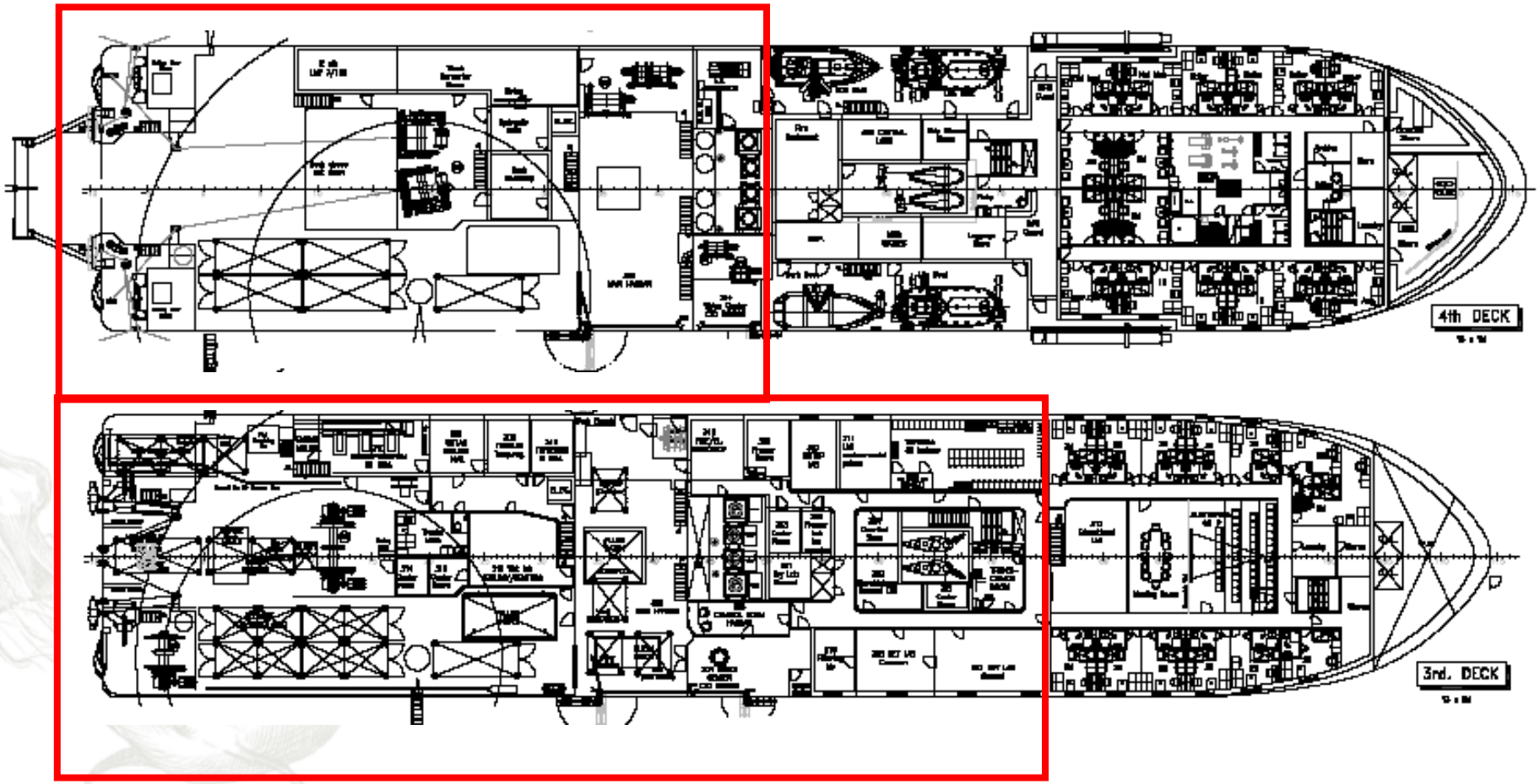
Aquamaster
US ARC 0.8
Z-drives

Helicopter deck



- Can land and refuel SAR helicopters
- Can hangar two small organic helikopters
- No ”interference” with scientific work on main deck during helo operations

Scientific area



Biology

- One set of trawl winches and double set of trawldoors and netdrums (demersal trawl in center and pelagic trawl on SB aft)
- Icegallow integrated in A-frame
- Multifrequency EK 60 i dropkeels
- Plankton nets
- Benthos grabs
- Fishlab on main deck port side
- Sea mammal observation platform above the bridge

Oceanography

- Physical and chemical oceanography
- Separate CTD hangar on SB side, forward of main hangar (equal to GOS)
- Also possible to deploy CTD/watersampler through moonpool i main hangar
- Moorings vil be deployed over the stern, over the SB side, or through the moonpool

Geology

- Deploy and tow airguns og streamer over the stern.
- Giant piston coring (GOS corer) over SB side (permanent installed corer winch below main hangar). Smaller corers over SB side or via moonpool
- Deploy MeBo drilling system over the stern
- Hullmounted multibeam echosounder for hydrography, and sub bottom profiler

AUV and ROV

- AUV Hugin to be operated over the stern (port side)

- ROV to be operated over SB side or via moonpool

IT system

- Local area network (LAN) with connection to all labs, cabins, offices, meeting rooms etc
- Satellitte communication system with continous shore connection for voice, internet, e-mail, radio and TV

Clean ship

- No particle emission to air or water when on station in the ice
- Use LNG generator for electrical power production
- All waste to storage tanks
- Means no contamination of samples from air, ice or water

Design challenges

- Radiated noise and vibrations
- Bubble sweep down
- Monpool design
- Hull mounted antennas
- Iceing
- Cargo capacity
- Functionality

Radiated noise and vibrations

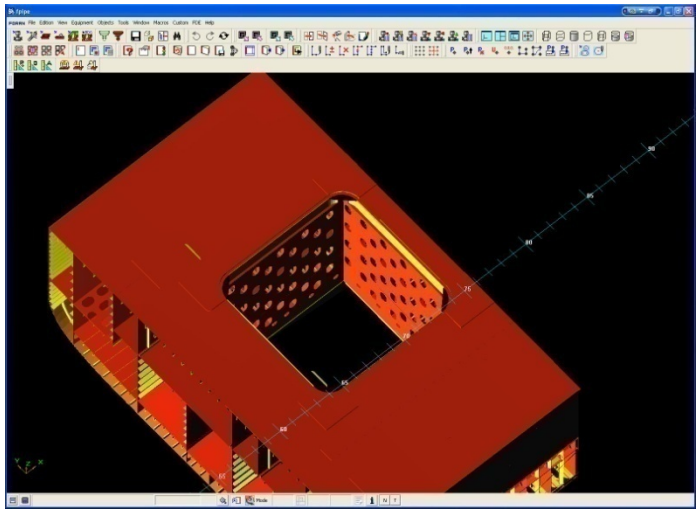
- Vessel will not be designed to completly meet ”ICES 209 recommendations for radiated noise” since acoustical stock assessment is not a primary function for the vessel
- However, every effort possible will be done in order to reduce noise and vibrations as much as possible to create the best possible working conditions for instruments and personnel

Bubble sweep down

- Air bubbles under the hull is a challenge for all hydroacoustical equipment on board
- Two drop keels will ensure good working conditions for EK 60 and ADCP
- The main problem is hullmounted multibeam echosounders and sub bottom profiler. The plan is to use a ”box keel” under the hull which lower the antennas approx 0,6m, in order to avoid some of the bubble flow along the hull

Moonpool design

- The moonpool will be used in ice covered waters in order to avoid exposure of instruments to very cold air and ice flows
- Must have a hatch in the hull to avoid filling the moonpool with ”slush” and iceflows
- Very strong upward forces from passing iceflows under the moonpool hatch can result in breaking or bending the hatch



Hull mounted instruments

- Dropkeels, multibeam echosounder and sub bottom profiler
- Hull is exposed to large upward forces during icebreaking
- Passing iceflows also represents upward forces and will in addition ”scratch” the hull’s surface and remove any part ”sticking out”
- Will install a ”tunnel” behind the sonar room where singel transducers can be mounted as back ups if drop keels cannot be deployed in ice waters

Iceing

Cold weather and iceing creates technical and operational challenges!

Specially for sensitive instruments!

Loading capasity

- Will have room for up to 25 20’ containers in the cargo holds, in the main hangar, and on deck
- In addition there are storage space spread around the vessel
- Main challenge will be to plan and organize loading/unloading, placement on board, temporary storage ashore etc, to avoid that the vessel sails with larger displacement than necessary, and that everybody find what they are looking for without to much effort !

Functionality

- The vessel will be large, with many functions, technically complex, and used by many different scientists/science groups, both in ice covered and open waters
- This puts high demands on flexibility and functional operation of the vessel, catering, lodging, technical support, maintainability, internal transport in the vessel, use of deck equipment and scientific labs and instruments
- The basis for efficient use and operation is developed in the designphase!


Questions?