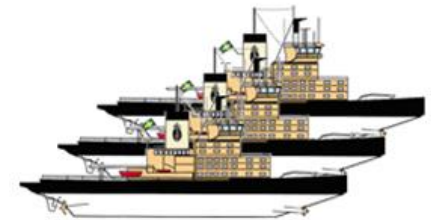


Activity 6

Technical upgrading and life extension of the icebreakers

ALTLE, FREJ, YMER and ALE are all old icebreakers build in the seventies.

The objective of Activity 6 is to carry out a life extension program in order to ensure sufficient icebreaking capacity for the next 10-15 years.



ALTLE, FREJ & YMER
Displ ton 8000 Built 1974-77
Length 104m Breath 23,8m
16200 kW



ALE
Displ ton 1500 Built 1973
Length 47m Breath 13m
3500 kW

Activity 6

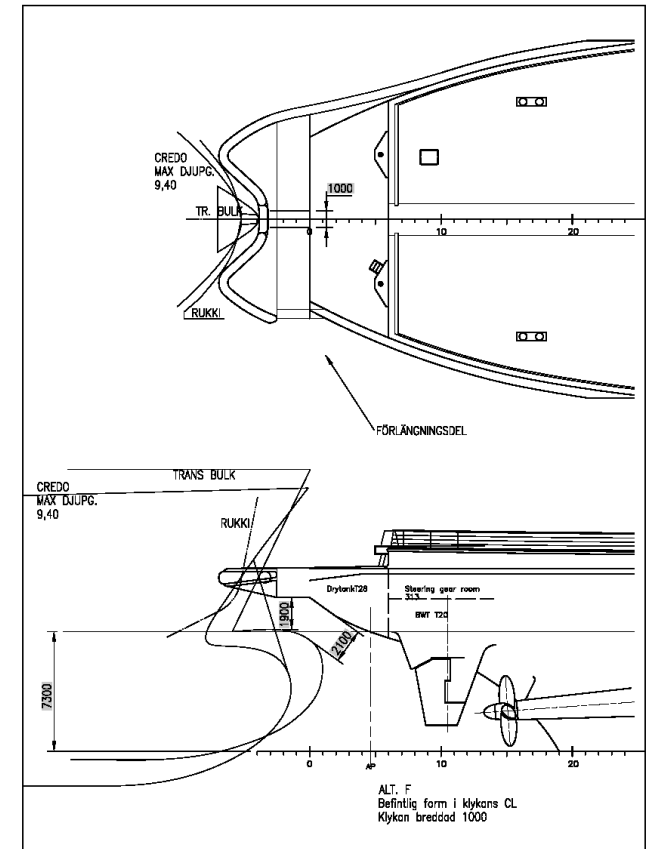
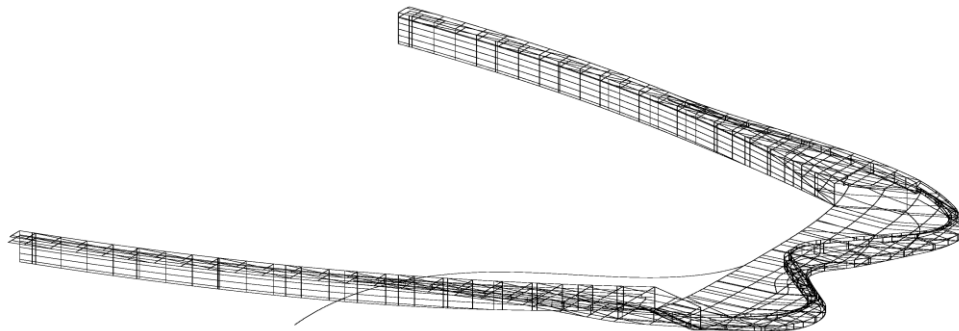
The life extension program consist of a large number of measures

Activity 6											
FREJ											
Towing notch											12
New Towing Winch											12
New Mooring Winches											12
Upgrading of heating system											12
Upgrading electric propulsion engines											12
Oil mist detector											12
Upgrading of pipe system											12
Ballast water treatment plant											12
Upgrading of exhaust system											12
Upgrading of lubrication system											12
Upgrading of fuel separators											12
Upgrading of engine control system											12
On board stability											12
ATLE											
Towing notch											12
New Towing Winch											12
New Mooring Winches											12
Upgrading of heating system											12
Life boats											12
Sewage treatment plant											12
Upgrading electric propulsion engines											12
Oil mist detector											12
Ballast water treatment plant											12
Upgrading of boilers exhaust system											12
Upgrading of lubrication system											12
Upgrading of fuel separators											12
Upgrading of engine control system											12
Upgrading engine monitoring system											12
YMER											
Towing notch											12
New Towing Winch											12
New Mooring Winches											12
Upgrading of heating system											12
Sewerage treatment plant											12
Upgrading sanitary compartments											12
Upgrading electric propulsion engines											12
Upgrading cooling water system											12
Upgrading bilge water treatment plant											12
Upgrading fuel oil separators											12
Upgrading engine control system											12
ALE											
Towing winch											12
Towing notch											12
Upgrading galley											12
Upgrading of heating system											12
Sewerage treatment plant											12
Upgrading living spaces											12
Upgrading electric propulsion system											12
New air bubbling system											12
Upgrading cooling water system											12
Upgrading engine control system											12
Upgrading engine monitoring system											12

Activity 6

Technical upgrading and life extension of the icebreakers

ATLE, YMER and FREJ have been equipped with new towing winches and towing notches to meet a new and increased average size and displacement of ships



Activity 6

Technical upgrading and life extension of the icebreakers

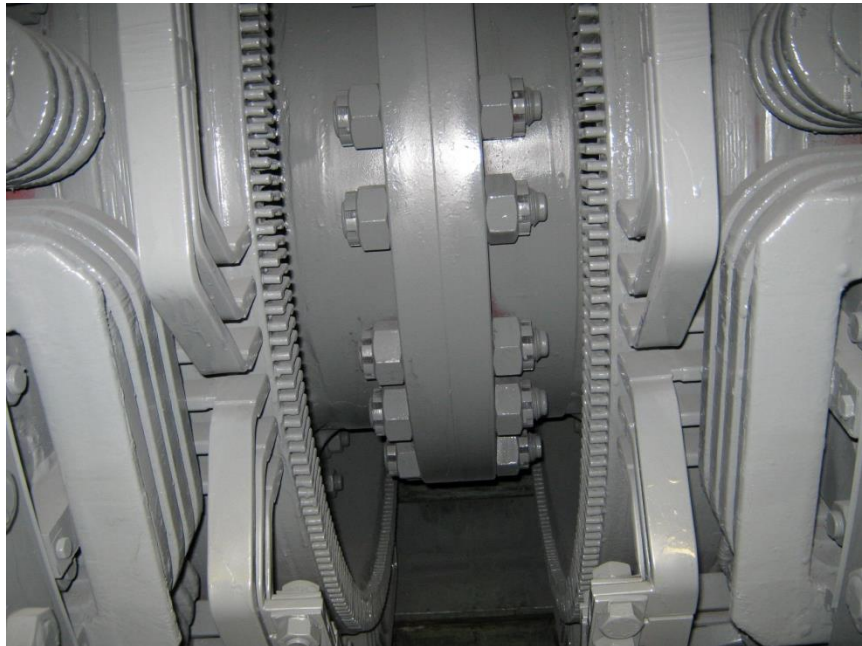
Water pipes in the sea water cooling system are replaced by glass fiber reinforced epoxy pipes.



Activity 6

Technical upgrading and life extension of the icebreakers

The electric propulsion machineries have been overhauled to new condition on all 4 IB.



Activity 6

Technical upgrading and life extension of the icebreakers

The old icebreakers can now be in operation for 10 -15 years more meanwhile the new building program of the next generation icebreakers is executed.