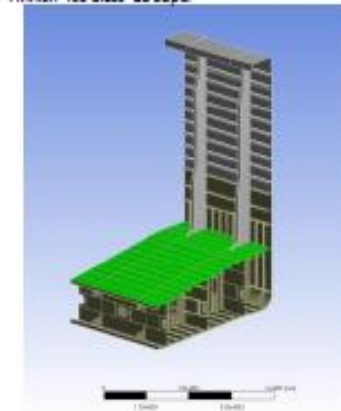




Detail Design

Design change to Aluminium Foam Steel requirements
Result gained 27% reduction in hull weight by Fraunhofer institute.

GERMANISCHER LLOYD / Bureau Veritas " Rules for Inland Navigation Vessels
" GL + 100 A5 I IN (0,6) MC 6 Finnish Ice Class 1s Super



E- LASS results :

(EU –Martec ULIVES project)

Old Facts became Myths in Arctic Inland Navigation Shipdesign

Arctic Countries (Wikipedia)

Arctic countries based
on countries or
countries territories
bordering the Arctic
Circle



Conventional design : ship for Polar studies



Year 2012 Finnish shipyard delivered to South Africa
A multipurpose passenger ice breaker study vessel

With length of 134 meters , 100 passengers/
scientists and 45 crew .

Hull weight abt 6000 tons

Conventional Giant Offshore oil platforms in Polar/Arctic area

Sewmash shipyard and offshore platform "Priraslonaya"



First Tanker in Polar / Arctic area



1969 converted to ice braking oil tanker
Length 290 meters

Basic ice strengthening design idea

Is to have Ice –bulb and increased steel to hull

Polar tanker

Whole new focsle head constructed for ice conditions

Polar offshore platform

Steel 150 mm / convetional cargo ship ship abt 12 mm

Polar ice breaker study vessel

Steel up to 6000 tons compared to same lenght conventional ship is max 2000 tons of steel.



Old Facts are prevailing Myths in Arctic ship design



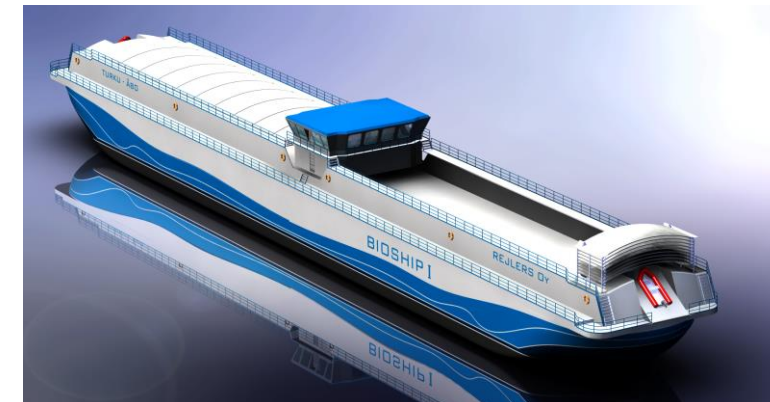
Old Fact / VTT report no 37/73/2009

Veikko Hintsanen
Helsinki
29.08.2013

- “The hull of the vessel in question was designed to be made of steel due to ice loads, which leads to the conclusion that it is **unrealistic that 30-50 % of the vessel’s own weight**” and further stated that the total gaining in weight saving using the AFS could therefore consist only as follows :
- The construction of the superstructure of the cargo hold from special materials would decrease the vessel’s weight by approx. 5 %.

New Fact

In the EU Martec ULIVES project /2007/2012 the design and studies of AFS Hull made jointly with Fraunhofer institute Chemnitz and engineering company SMK Germany resulted to 27% lightening of the hull.



Myth no 1 (ship construction)

Ice strengthening can be made only by increasing steel to hull

Fact

Laffcomp jointly with Fraunhofer institute and Engineering company SMK have designed
And tested that abt 27% lighter hull compared to steel
construction can be constructed when
Utilizing Aluminium foam construction.




Myth no 2 (Ice cover in Arctic waters of Finland)




- The ice cover prevents economically viable , "inland navigation" logistics planning in Arctic Area

Fact http://www.mmm.fi/attachments/mmm/julkaisut/julkaisusarja/5entWjJli/MMMjulkaisu2005_1.pdf

- Ice strength in Finnish ports are abt 30 cm and in near future in adjacent sea area will decrease abt 5-60 %
- The inland water ice cover period will shorten in autumn couple of weeks and in spring from one to two months .

Ultra light ice going vessel is designed to sail without icebreaker assistance in thicknes of 60 cm of ice having abt 20% more cargo space than conventionally designed vessels.

Wood chip & peat Transport at Jyväskylä power plant max 5 mill/m3 /year	2 ships 24hrs/day 365/days a Year 	25 trucks 24hrs/day 365/days a Year 
Investment 30 years	22 mill €	37,5 mill €
	17 persons. = 1,5 mill€/v.	136 persons= 7,5 milj. €/v.
Distances to drive/sail / year.	142 000 km	7 mill. km
Fuel consumption	1 000 000 litres (600 hv/0,13 lt/hp/hrs speed. 6 knots)	2 800 000 litres (40 litres / 100 km speed. 50 km/t)
Loading /dischargin	Own equipment: pneumatic system; no harbour facilities required.	Loaders required in each loadplace
CO2 And LCA / LCC	Project with lappeenranta University commenced 2.1.2008 - complete 31.12.2008	

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Myth no 3 (Conventional Inland water area logistics)

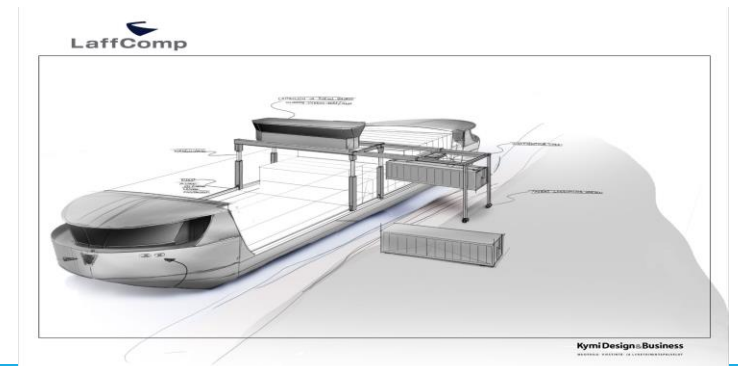
- Inland navigation vessels can compete with trucks , but only in long distance trips over 300 kms

Fact

<https://helda.helsinki.fi/handle/10138/42905>

In wood chip logistics the carbon dioksides and economical viability on trucking was 52 kms. Afer which the inland navigation logistics (conventional design) were less pollutive .

New Ultra light indpendently ice going vessels are consuming 50% less fuels and polluting air abt 60% less than trucks in same short distance trips /
Lappeenranta university /2008/2009



Myth no 4 (EU traffic strategy & Arctic)

In Arctic area (Finland) the EU strategy to transfer truck traffic volymes to waterborne transport -inland navigation needs not to to be applied due to prevailing circumstances.

Fact

Future committee in Finnish Parliament in their report no 6/2013 issued that Logistic costs are double high costs compared to our competing countries.

The only difference what we have in Finland that we have not developed our inland navigation Therefore we have three times more trucking compared to Germany /1000 inhabitant.



Country	Inland route kms	Inland freight Road/Rail/IWW	World Bank LPI - 2014	Trucks /1000 inhabitant
France	8500	81/15/4	13	87
Finland	7842	74/26/0	24	93
Holland	5046	58/5/37	2	59
Germany	4350	66/23/11	1	33
Sweden	1165	62/38/0	6	56
Spain	0	95/5/0	18	114

Conclusions

Ice strengthening of the ships and fuel efficiency with conventional methods have been and are in very big conflict with each other

Lightweight design gives new alternatives to Politicians to make more efficient and sustainable Traffic Development also in Arctic Area.



Study case:
m/t "OLYMPUS"
m/t "TELLUS"

Length: 124 m
Capacity of cargo tanks: 11'000 m³.

Owner: Sirius Shipping - Donsö



Calculation of Return of Investment:
"1 Ton saved weight in superstructure is 1 Ton more cargo capacity"

Input from Owner: "1 Ton extra cargo capacity (refined petroleum products) is worth 10'000 – 15'000 SEK/Year."