GAS ENGINEERING

ALL UNDER ONE ROOF

Design – custom made in Germany

- GAS TANKERS
- HULL STRUCTURES
- CARGO SYSTEMS
- FUEL GAS SYSTEMS
- CARGO TANKS
- FUEL GAS TANKS
- GAS SKIDS

HB HUNTE ENGINEERING

ABOUT HB HUNTE ENGINEERING

During the last years, HB Hunte Engineering has developed innovation exponentially in the fields of ship and plant arrangement, propulsion and consumption and – put the two together –

economical and ecological efficiency.

HB Hunte Engineering offers designs for
- gas cargo plants;
- gas fuel plants;
- gargo gas tanks;
- fuel gas tanks.

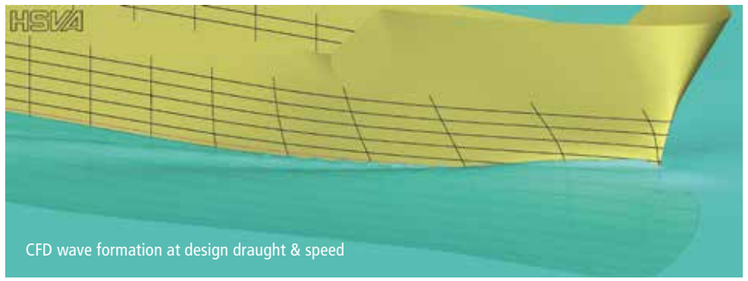
HB Hunte Engineering offers designs for
- ship's basics and theory;
- ship's hull structure;
- ship's piping systems;
- ship's piping routing.

And, of course, HB Hunte Engineering offers
- it all in combination.

The gas tanker around your cargo plant.
The cargo plant on and inside your gas tanker.

All of it to the latest state of the art, custom-made in Germany to the needs of global-acting owners.

Svelte Bow model in tank



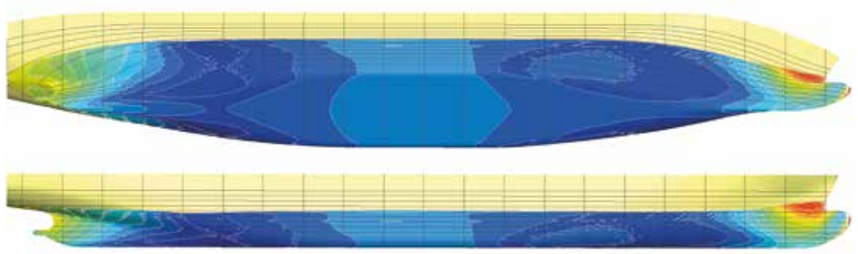
CFD wave formation at design draught & speed

ALL UNDER ONE ROOF.

With communication channels short.
A recipe to generate some of the world's most modern and efficient gas carriers.

Step a little closer.

But, HB Hunte Engineering also goes on board:
- if you need a conversion, refit, repair project manager;
- if you need a site inspector;
- if you need consultancy service.


CFD results at design draught & speed. HB Hunte has developed in a constant cooperation with HSVA highly optimized gas tanker hull lines.

Give us a call!

GAS TANKER – INNOVATIVE GREEN SHIP DESIGN

ECOSTAR 36k, 36.000 m³ LEG/LPG Tanker (semi-refrigerated)

World's first ethane fuelled, eco-friendly LEG carrier

IN CO-OPERATION WITH HARTMANN REEDEREI, HB HUNTE ENGINEERING DEVELOPED THIS UNIQUE, NEW TYPE OF VESSEL WITH *SVELTE*-BOW DESIGN.

The new vessel type differs fundamentally from conventional gas carriers: As the first of its kind, its superstructures will be located at the bow. This results in optimized distribution of weight and, therefore, a reduced demand for ballast water – which again leads to reduced fuel consumption and emissions at the same time. The new *Svelte*-bow design enables the vessel to improve seakeeping at higher transit speeds and improved fuel efficiency.

The latest generation of the MAN B&W dual fuel 2-stroke engine on diesel combustion principle will be installed. This type of engine is characterized by its particularly high reliability and low fuel consumption. ECOSTAR 36K will be able to operate on HFO, MGO and, as a world novelty, on ethane. The fuel gas system is prepared for LNG and, if necessary, the ship can run on LNG as well. The vessel's autonomous gas fuel tanks are laid out for ethane and LNG and enable an operating range of about 10,000 nautical miles.

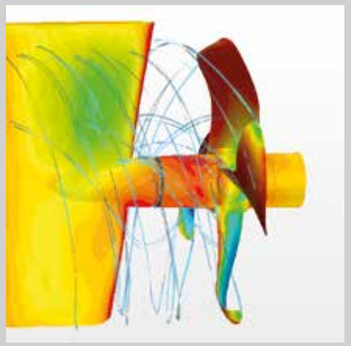
GAS TANKER – INNOVATIVE GREEN SHIP DESIGN

ECOSTAR 36k

Additionally, the novel design incorporates heavy fuel oil tanks for the same distance. If necessary, it is possible to switch over from gas to diesel operation and vice versa immediately.
Propulsion efficiency will be further improved by adopting a MAN Kappel propeller with rudder bulb system and a Twist-flow Rudder developed by HB Hunte Engineering and MM-Offshore. Ship model tests at »Hamburgische Schiffbau-Versuchsanstalt« (HSVA) proved reduced energy loss and improved propulsion efficiency.
The gas plant was jointly developed and realized by Hartmann Reederei and HB Hunte Engineering. It will be located in a sheltered space behind the superstructure. Its components will be provided by AC-INOX. The cargo tanks present another world innovation. Compared to conventional gas carriers with cylindrical or bilobe tanks, ECO STAR 36K adopts a new tank design developed by Hartmann Reederei: the »Star-Trilobe«-tank. Instead of two, it consists of three overlapping cylinders. Better cargo hold room utilization brings an increase in cargo capacity by nearly 30 % at the same ship dimensions – leading to higher efficiency and reduced shipping costs through higher economy of scale.

SPECIAL FEATURES

MAN Kappel Propeller



CFD Optimization

Star-Trilobe Tank abt. 12.300 m³

MM-Offshore »Empress Rudder« with full-twist leading edge

ECOSTAR 36k

- **3 vessels ordered, delivery 2016-2017.**

SHIP'S BASIC INFORMATION

Builders: Sinopacific Offshore & Engineering Co., LTD., China
Flag: Liberia / Port of registry Monrovia
Classification: DNV GL ✠ 100 A5 LIQUEFIED GAS CARRIER (-104°C, 4.1 bar gauge: 0.602 t/m³) type 2-G, NAV, IW, BWM (D2), INERT, ERS DNV GL ✠ MC-AUT GF, RI, CM-PS, EP-D

DIMENSIONS AND MAIN DATA

Length o. a.	188.30 m
Length b.p.	178.82 m
Breadth	29.00 m
Depth	17.50 m
Depth to trunk deck	23.46 m
Design draft	9.50 m
Speed with ethane cargo (max. bft 2)	16.50 kn/18 kn max.
Crew complement	23

TANK CAPACITY

IFO 380 abt. 1,188 m³ (98 %) / MGO abt. 277 m³ (98 %)
Freshwater abt. 81 m³ / Waterballast abt. 4,675 m³

GAS TANK CAPACITY

Cargo Tanks

Tank 1	abt. 11,474 m³ /	abt. 11,245 m³	(100 % volume / 98 % volume)
Tank 2	abt. 12,305 m³ /	abt. 12,059 m³	(100 % volume / 98 % volume)
Tank 3	abt. 12,322 m³ /	abt. 12,076 m³	(100 % volume / 98 % volume)

Fuel Gas Tanks

1 + 2	abt. 1,630 m³ /	abt. 1,597 m³	(100 % volume / 98 % volume)
Total	**abt. 37,731 m³ /**	**abt. 36,977 m³**	(100 % volume / 98 % volume)

Our services comprise basic design, engineering the entire mid ship area with cargo and fuel gas plant.

GAS TANKER – INNOVATIVE GREEN SHIP DESIGN

ECOSTAR 85k, 85.000 m³ LEG/LPG Tanker (semi-refrigerated)

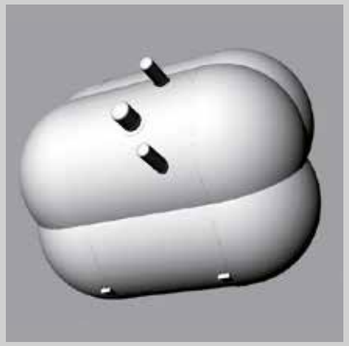
World's largest ethane fuelled, eco-friendly LEG carrier

TRIPLE-FUEL – ETHANE POWERED – READY FOR LNG

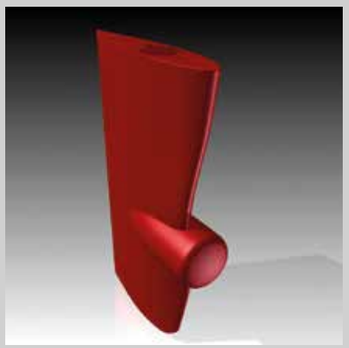
SPECIAL FEATURES

MAN Kappel Propeller

Model test arrangement



Star Trilobe Tank abt. 23.200 m³



MM-Offshore »Empress Rudder« with full-twist leading edge

ECOSTAR 85k

- **5 vessels ordered, delivery starting 2017-2018.**

SHIP'S BASIC INFORMATION

Builders: Dalian Shipbuilding Industry Offshore Co., Ltd. (DSIC), China
Flag: Singapore / Port of registry Singapore
Classification: DNV GL ✠ 100 A5 LIQUEFIED GAS CARRIER (-104°C, 4.1 bar gauge: 0.602 t/m³) type 2-G, NAV, IW, BWM (D2), INERT, ERS DNV GL ✠ MC-AUT GF, RI, CM-PS, EP-D

DIMENSIONS AND MAIN DATA

Length o.a.	231.60 m
Length b.p.	225.50 m
Breadth	36.60 m
Depth	22.00 m
Depth to trunk deck	30.95 m
Design draft	12.00 m
Speed with ethane cargo (max. bft 2)	16.00 kn
Crew Complement	23

TANK CAPACITY

IFO 380 abt. 2,240 m³ (98 %) / MGO abt. 986 m³ (98 %)
Freshwater abt. 240 m³ / Waterballast abt. 17,800 m³

GAS TANK CAPACITY

Cargo Tanks

Tank 1	abt. 23,200 m³ /	abt. 22,736 m³	(100 % volume/ 98 % volume)
Tank 2	abt. 23,200 m³ /	abt. 22,736 m³	(100 % volume/ 98 % volume)
Tank 3	abt. 23,200 m³ /	abt. 22,736 m³	(100 % volume/ 98 % volume)
Tank 4	abt. 13,880 m³ /	abt. 13,602 m³	(100 % volume/ 98 % volume)

Fuel Gas Tanks

1 + 2	abt. 2,020 m³ /	abt. 1,980 m³	(100 % volume/ 98 % volume)
Total	**abt. 85,500 m³ / abt. 83,790 m³**		(100 % volume/ 98 % volume)

Our services comprise basic design, engineering the entire mid ship area with cargo and fuel gas plant.

GAS TANKER – INNOVATIVE DESIGN

5.000 m³ LPG Tanker (fully pressurized)

• 6 vessels delivered in 2012-2013: JS COUGAR, JS LEKVAR, JS CAESAR, JS CHUKAR, JS ALULAR, JS JAGUAR

SHIP'S BASIC INFORMATION

Builders: Sinopacific Shipbuilding Group, Shanghai, China
Flag: Singapore / Port of registry Singapore
Classification: GL ✠ 100 A5 LPG Carrier (-10°C; 18.6 bar gauge:0.956 t/m2) Type 2-PG, Nav-O, IW, BWM

DIMENSIONS AND MAIN DATA

Length o. a.	99.90 m
Length b.p.	92.50 m
Breadth	17.40 m
Depth	11.70 m
Deadweight	abt. 4,900 mt
Mean draft in sea water on sfb	7.20 m
Speed laden (max. bft 4)	abt. 14.00 kn
Crew complement	16

TANK CAPACITY

IFO 380 abt. 686 m³/ MGO abt. 176 m³
Freshwater abt. 218 m³/ Waterballast abt. 1,929 m³

CARGO CAPACITY

Tank 1	abt. 1,788 m³	/	abt. 1,752 m³	(100 % volume/ 98 % volume)
Tank 2	abt. 3,221 m³	/	abt. 3,157 m³	(100 % volume/ 98 % volume)
Total	**abt. 5,010 m³**	**/**	**abt. 4,909 m³**	(100 % volume/ 98 % volume)

Our services comprise the complete design and engineering with gas plant.

6.500 m³ LEG/LPG Tanker (semi-refrigerated)

• 6 Vessels built: GASCHEM SHINANO 2007, GASCHEM LEDA 2007, GASCHEM MOSEL 2007, GASCHEM RHONE 2008, GASCHEM WARNOW 2010, GASCHEM WERRA 2011

SHIP'S BASIC INFORMATION

Builders: Severnav, Turnu Severin, Romania
Flag: Liberia / Port of registry Monrovia
Classification: GL ✠ 100 A5 liquefied Gas tanker Type II G, NAV-O, BWM Type 2G +MC AUT INERT

DIMENSIONS AND MAIN DATA

Length o. a.	114.89 m
Length b.p.	109.51 m
Breadth	16.80 m
Depth	11.83 m
Deadweight	7,340 mt
Mean laden draft in sea water on sfb	8.10 m
Speed laden (max. bft 2)	15.50 kn
Crew complement	18

TANK CAPACITY

IFO 380 abt. 800.0 m³ (98 %) / MGO abt. 262.0 m³ (98 %)
Freshwater abt. 127.0 m³ / Waterballast abt. 1,362.0 m³

CARGO CAPACITY

Tank 1	abt. 1,969 m³	/	abt. 1,930 m³	(100 % volume/ 98 % volume)
Tank 2	abt. 4,492 m³	/	abt. 4,402 m³	(100 % volume/ 98 % volume)
Total	**abt. 6,461 m³**	**/**	**abt. 6,332 m³**	(100 % volume/ 98 % volume)

Our services comprise the complete design and engineering with gas plant.
We were involved in project management and equipment supply.

GAS TANKER – INNOVATIVE DESIGN

8.500 m³ LEG/LPG Tanker (semi-refrigerated)

• 3 Vessels built: GASCHEM ATLANTIC 2009, GASCHEM ARCTIC 2010, GASCHEM CARIBIC 2011

SHIP'S BASIC INFORMATION

Builders: Severnav SA, Turnu Severin, Romania
Flag: Liberia / Port of registry Monrovia
Classification: GL ✠ 100 A5, NAV-O, BWM, T2P21, ERS, Liquefied Gas Tanker Type-2G, + MC AUT INERT

DIMENSIONS AND MAIN DATA

Length o. a.	128.81 m
Length b.p.	121.66 m
Breadth	17.80 m
Depth	11.90 m
Deadweight max.	abt. 9,262 mt
Mean draft in sea water on sfb	8.60 m
Speed with ethylene cargo (max. bft 2)	16.50 kn
Crew complement	19

TANK CAPACITY

IFO 380 abt. 912 m³ (98 %) / MGO abt. 206 m³ (98 %)
Freshwater abt. 217 m³ / Waterballast abt. 1,737 m³

CARGO CAPACITY

Tank 1	abt. 2,363 m³	/	abt. 2,315 m³	(100 % volume/ 98 % volume)
Tank 2	abt. 3,018 m³	/	abt. 2,958 m³	(100 % volume/ 98 % volume)
Tank 3	abt. 3,018 m³	/	abt. 2,958 m³	(100 % volume/ 98 % volume)
1 Decktank	abt. 99 m³	/	abt. 96 m³	(100 % volume/ 98 % volume)
Total	**abt. 8,498 m³**	**/**	**abt. 8,327 m³**	(100 % volume/ 98 % volume)

Our services comprise the complete design and engineering with gas plant.
We were involved in project management and equipment supply.

5.000 m³ LPG Tanker (fully pressurized)

INNOVATIVE SVELTE BOW – TRIPLE-FUEL – LPG POWERED

SHIP'S BASIC INFORMATION

Classification: DNV GL ✠ 100 A5 LPG Carrier type 2-PG (-10°C; 18.6 bar gauge: 0,956 t/m³), NAV-O, IW, BWM, + MC-AUT, ENVIRONMENTAL PASSPORT

DIMENSIONS AND MAIN DATA

Length o. a.	99.90 m
Length b. p.	94.50 m
Breadth	18.00 m
Depth	11.25 m
Design draft (LPG draft)	abt. 5.80 m
Deadweight	abt. 4,800 mt
Speed laden	abt.14.00 kn
Crew complement	16

TANK CAPACITY

IFO 380 abt. 686 m³ / MGO 176 m³
Freshwater abt. 100 m³ / Waterballast abt. 1.800 m³

CARGO CAPACITY

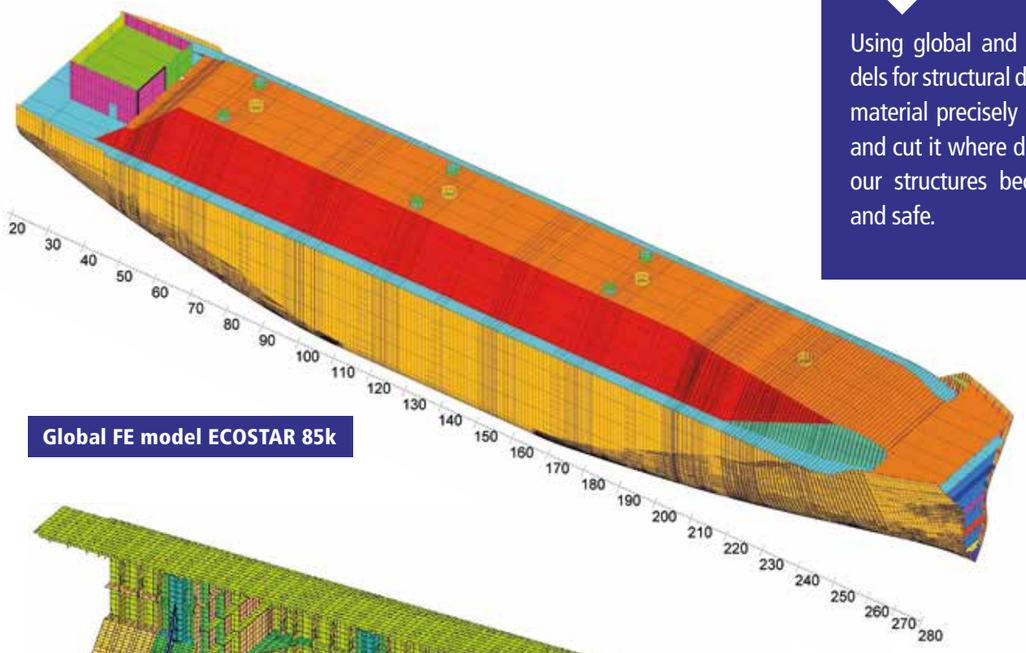
Tank 1	abt. 1,788 m³	/	1,752 m³	(100% volume / 98% volume)
Tank 2	abt. 3,221 m³	/	3,157 m³	(100% volume / 98% volume)
Total	**abt. 5,009 m³**	**/**	**4,909 m³**	(100% volume / 98% volume)

Our Services comprise: Concept design, hull and propulsion optimization, model tank tests with sea-keeping tests.

GAS TANKER – STRUCTURAL DESIGN

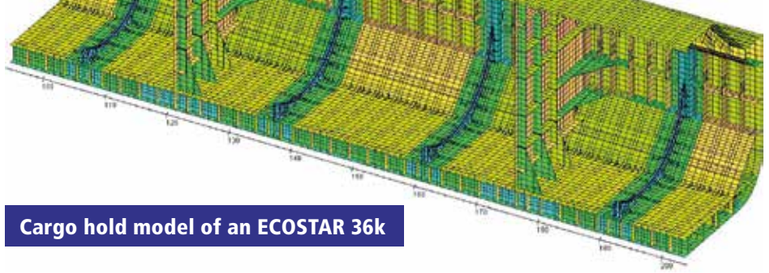
Our services:

• Basic and detail engineering, workshop documentation, global and local strength analysis, temperature and vibration calculations



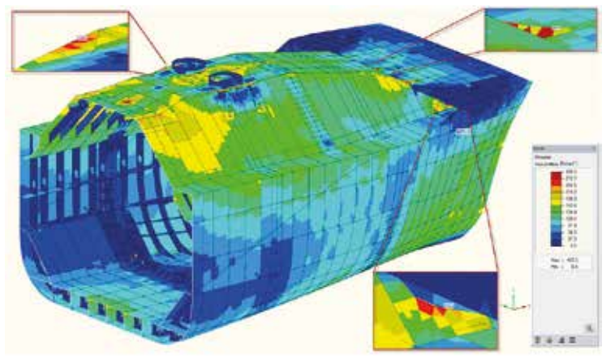
Global FE model ECOSTAR 85k

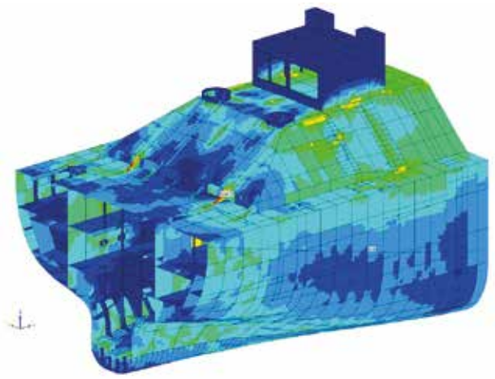
Using global and local hull models for structural design we place material precisely where needed and cut it where dispensable. So, our structures become efficient and safe.



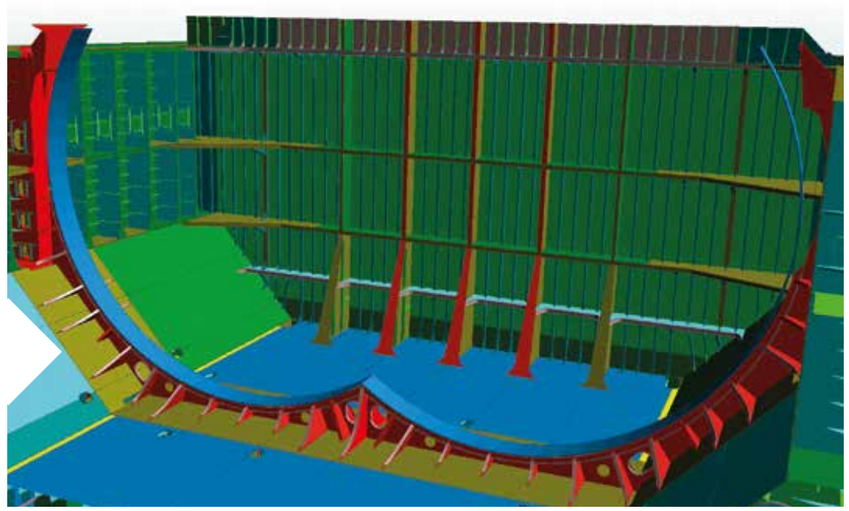
Cargo hold model of an ECOSTAR 36k

Our hull models verify our structures in regard to strength, fatigue strength, buckling, vibration & temperature.





Detailed FE models for strength check of fore- and aftship transitions



Optimized cargo hold structure of ECOSTAR 36k: completely designed and calculated using state-of-the-art software.

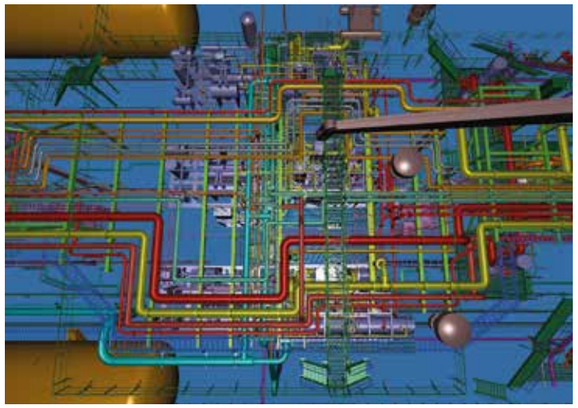
Cargo hold structure of ECOSTAR 36k during construction at Dayang Shipyard, China.

Cargo hold structure of ECOSTAR 36k with Star-Trilobe tanks installed.
One cargo tank per day was mounted trouble-free.

CARGO SYSTEM DESIGN

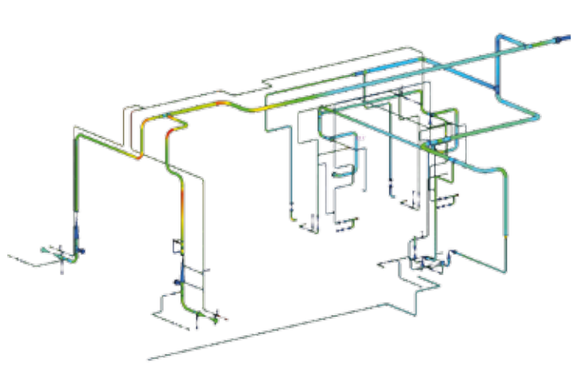
Our services:

• P&I diagrams, 3D-coordination, pipe stress analysis, isometrics, workshop documentation of gas plant related steel structures and equipment, supervision during building process and commissioning of cargo system.



3D coordination model of ECOSTAR 85k, top view to compressor shelter

3D coordination model of ECOSTAR 36k, side view to compressor shelter



Pipe stress analysis of a LNG system

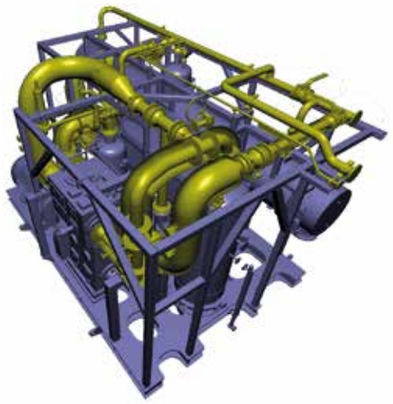
Cargo manifold system in construction

GAS SKID DESIGN

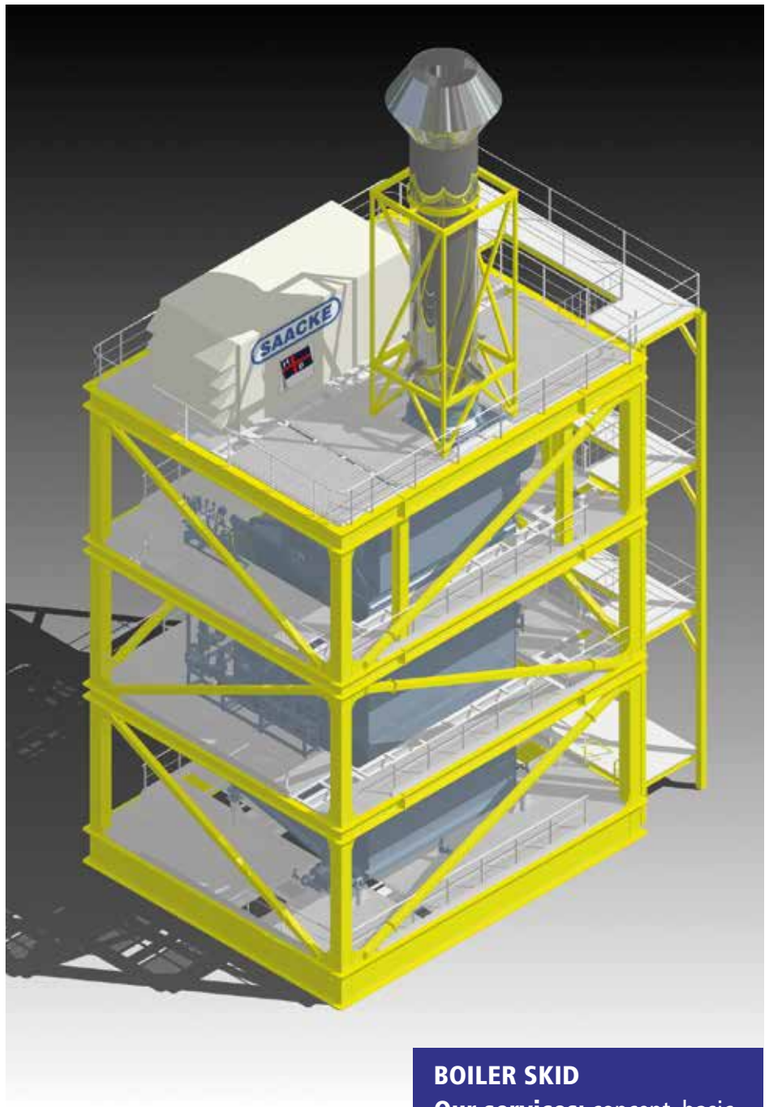
Our services:

• Concept design, system design, piping design, pipe stress analysis, structural design, strength calculation, vibration calculation, temperature calculation

ETHANE VAPORIZER SKID
Our services: strength calculation, vibration calculation & integration into the cargo system



CARGO COMPRESSOR SKID
Our services: concept, basic design, strength calculation, vibration calculation & integration into the cargo system

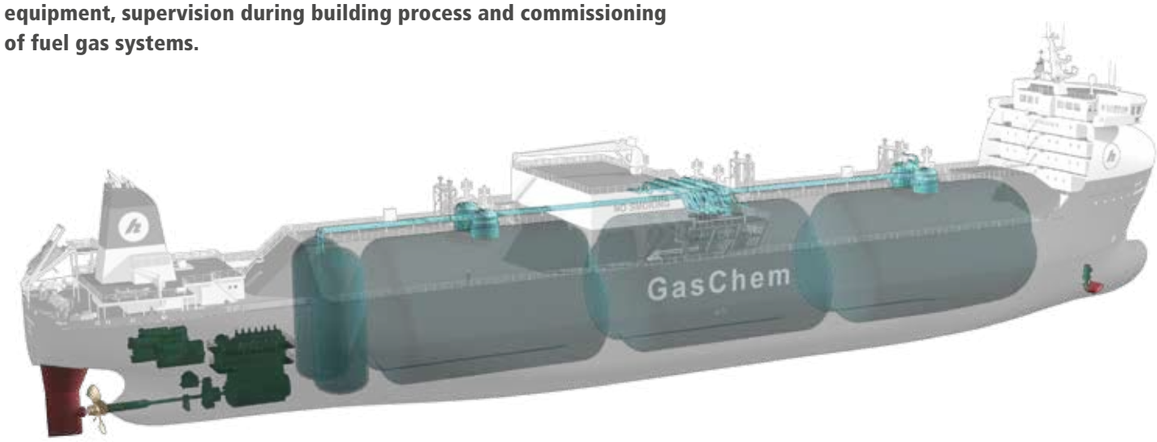


BOILER SKID
Our services: concept, basic design, strength calculations

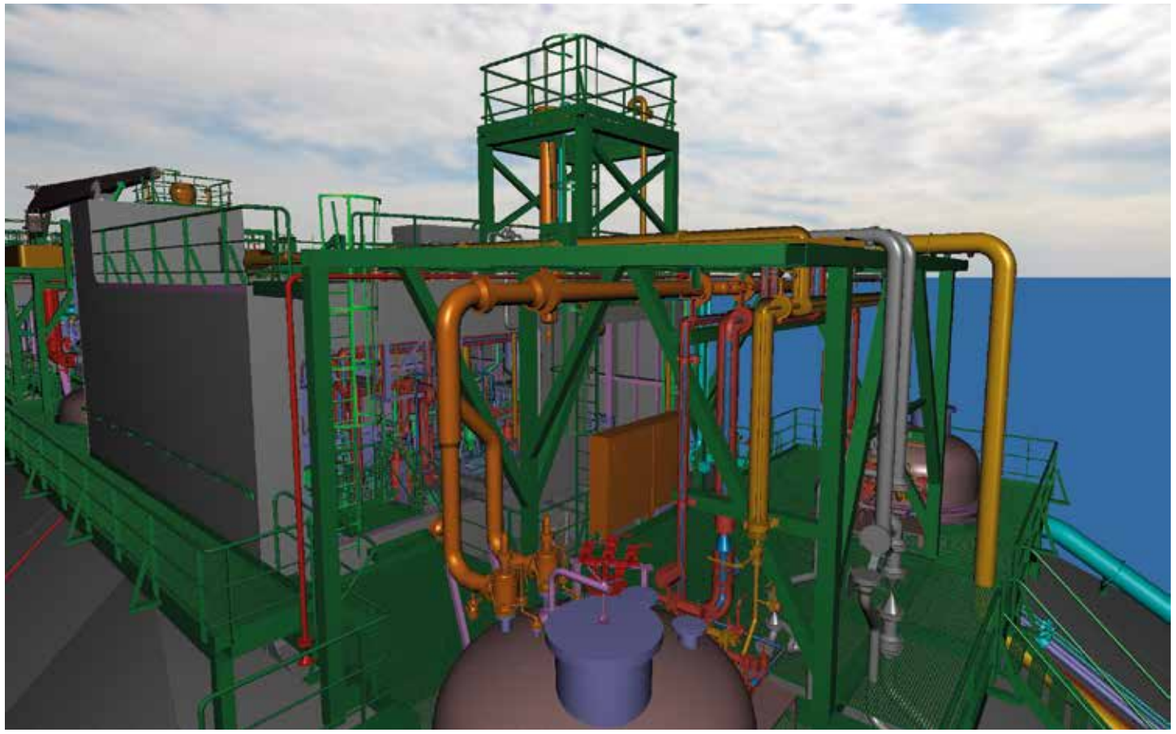
FUEL GAS SYSTEM DESIGN

Our services:

• Consulting, feasibility studies, fuel gas concepts, P&I diagrams, 3D-coordination, pipe stress analysis, fuel gas skid design, isometrics, workshop documentation of fuel gas plant related steel structures and equipment, supervision during building process and commissioning of fuel gas systems.



LEG carrier ECOSTAR 36k – triple-fuel, the world's first ethane driven LEG-Carrier, ready for LNG
Our scope: Integration of fuel gas system and fuel gas tanks (tank foundation strength and temperature calculation, P&I diagram, 3D coordination, isometrics, pipe stress analysis)

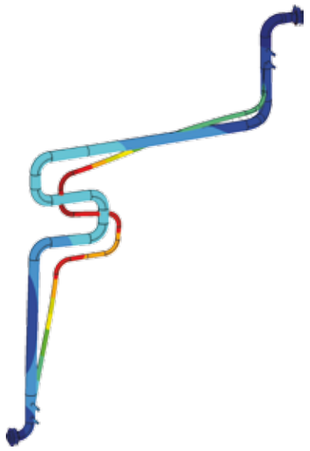


Fuel gas system of ECOSTAR 36k

FUEL GAS SYSTEM

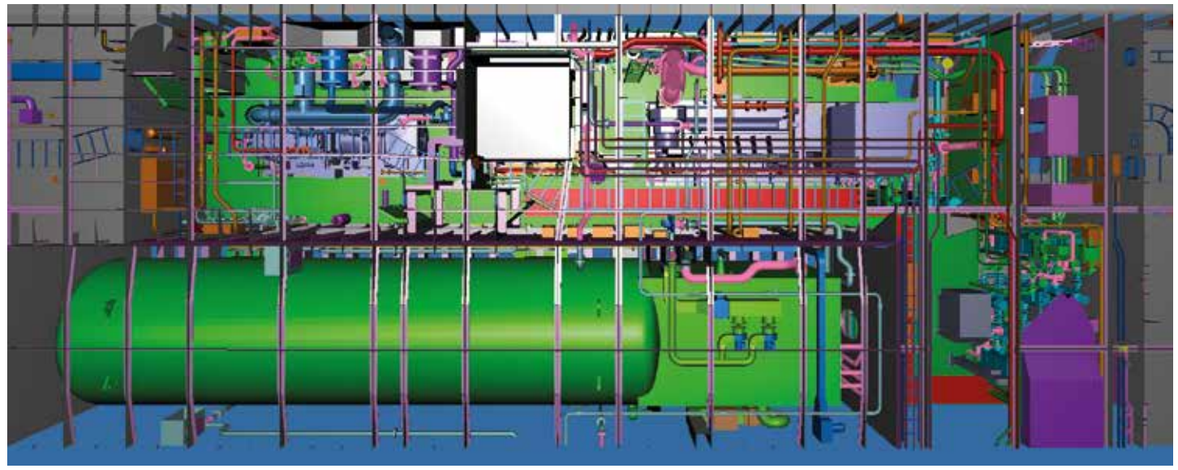
Conversion of ferry »Ostfriesland«

Our services: shipyard consulting, integration of LNG fuel gas system and LNG fuel gas tanks (tank foundation strength and temperature calculation, 3D coordination, isometrics, pipe stress analysis), supervision and fuel gas system commissioning



Pipe stress analysis for bunker line

3D coordination model side view showing the fuel gas tank and fuel gas system

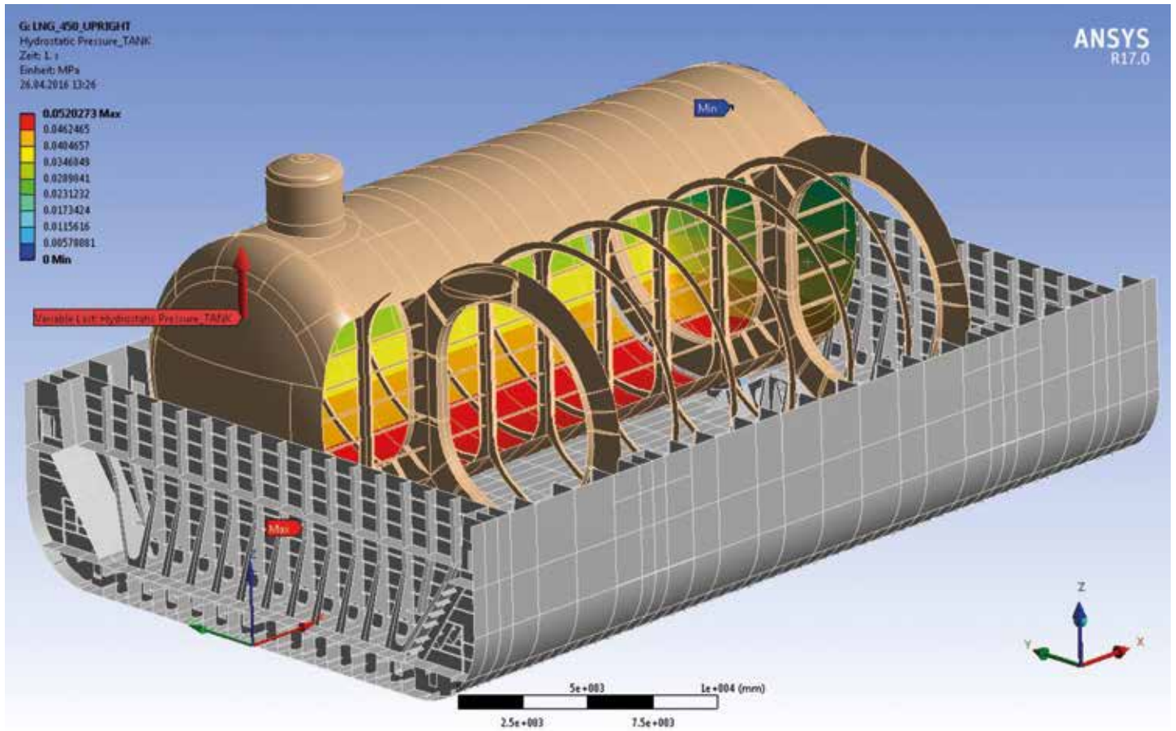


3D coordination model top view showing the fuel gas tank and fuel gas system

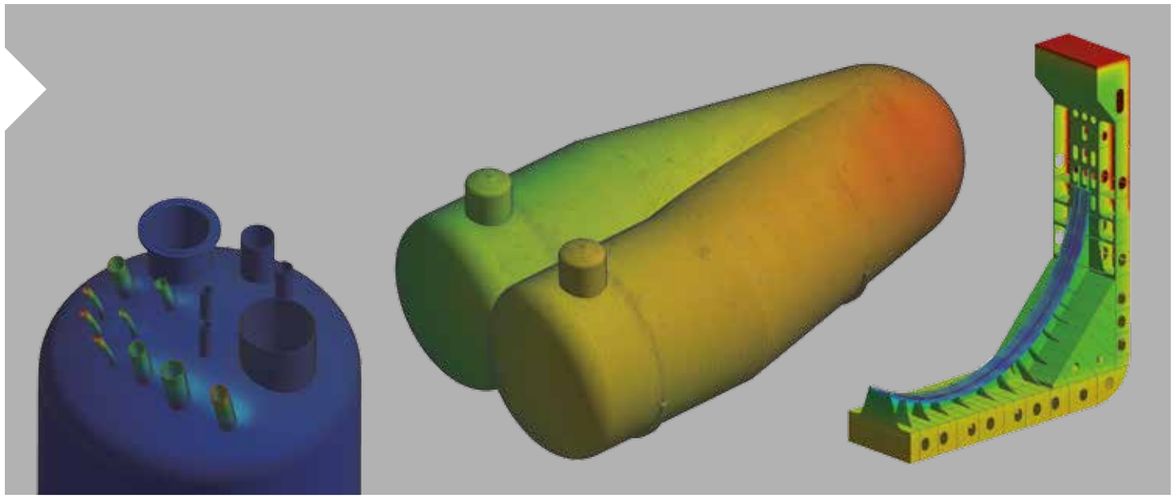
CARGO TANK DESIGN

Our services:

• Cargo tank and tank support design, basic and detail engineering strength, temperature and vibration calculations.

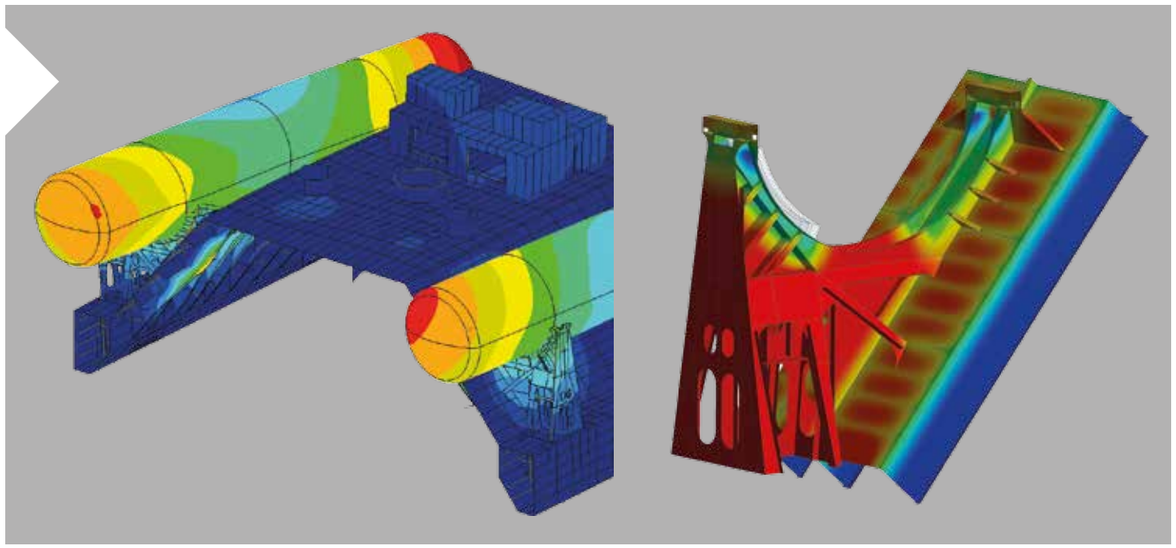


Interaction simulation of cargo tank and hull structure considering fix and sliding support and thermal contraction



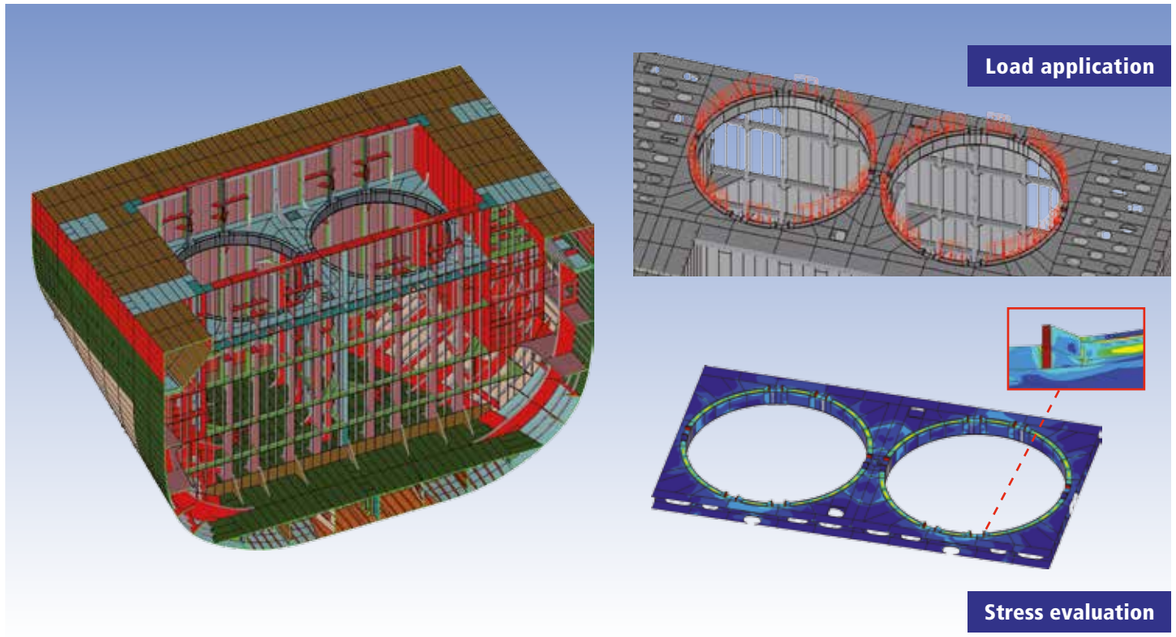
Direct coupled thermal structural analysis of cargo tanks and hull structure

FUEL GAS TANK DESIGN



Vibration calculation for a fuel gas tank system on open deck

Temperature calculation for tank saddle support and deck structure



Design of a tank foundation structure for a hanging fuel gas tank system in its compartment. We performed concept design, structural design, strength, vibration and temperature calculation

HB HUNTE ENGINEERING
Decades of proven gas tanker designs

HB Hunte Engineering is owned by the Brand family and designs gas tankers and gas plants for more than 15 years.
16 gas tankers are actually sailing successfully based on HB Hunte designs. 8 further gas tanker newbuildings are under construction and will be delivered in 2017 and 2018.
Out of HB Hunte's shipyard history their management can present gas tanker and gas plant design experience for more than 55 years.

In 1972 Brand Shipyard built the first dual-fuel powered gas tanker ever built in Germany, named »Melrose«. At the moment, HB Hunte is involved in several LNG and Ethane Fuel Gas Projects.

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