

## Summary

Roughly this report consists of a short look at the different types of offshore cranes, also called marine cranes. Some details of the main active companies. An overview of available offshore cranes with their technical specifications. And technical details of the floating heavy lift cranes available and being built today.

### Offshore / marine cranes

The offshore crane, or also called marine crane if they are installed on a ship, market can roughly be divided into three types, the mast cranes, the pedestal mounted cranes and the knuckle jib cranes. The mast crane consists of a mast welded to the ship, and a jib which can rotate around the mast, mounted on the so called slewing platform. The advantages of the mast crane are the small installation area required and the forces being absorbed by the slewing platform and not the lower bearing. The disadvantage is the area required below deck for all the hoisting equipment.



Figure 0.1: Mast crane

The available mast cranes (figure 0.1) available today have a wide range of lifting capacities, if we look at available 60 ton versions and we compare two types, one from MacGregor and one from TTS, they have about the same specifications. The MacGregor is less heavy and has the highest hoisting speeds, the TTS has the fastest luffing times. Specifications can be found in table 0.1.

	SWL	Radius	Lifting height	Hoisting speed	Luffing time	Slewing speed	Power	Weight
MacGregor GL6028	60t@28m 40t@32m	4,8 - 28m	35m	15 / 25m/min	78s	0,7rpm	280kW	57 ton
TTS KL 80t	80t@20m 40t@28m	3,8 - 23m		9 / 23 m/min	65s	0,7rpm	160kW	68,5 ton

Table 0.1: Comparison 60-80 ton mast cranes

The heavy lift mast cranes are available in the range from 200 to 1000 tonnes. If we compare two heavy lift mast cranes of 800 ton, one from Huisman and one from TTS. The Huisman crane has the smallest radius, the TTS crane is equipped with a longer mast and therefore capable of placing loads further away. Some specifications can be found in table 0.2.

	SWL	Radius	Hoisting speed	Luffing time	Slewing speed
Huisman 800t	800t@28m	5 - 27,5m	2,2m/min		
TTS KL 800t	800t@22m 450t@35m	6,5 - 35m	2,0 / 11m/min	660s	0,12rpm

Table 0.2: Comparison 800 ton mast cranes

The second type is the pedestal mounted crane (figure 0.2), this crane is as its name suggests, mounted on a pedestal. All the equipment is located on the platform, or even inside the mast. This

crane only needs some space above deck, so very useful if the space below deck is needed for cargo. The disadvantages are the bearing forces.

Also for the pedestal mounted cranes, different categories can be distinguished, the normal cargo cranes of 40t, the heavy lift with capacities over 300t, both equipped with a wire luffing system. The type with cylinder luffing boom has only capacities around 40t.



Figure 0.2: Pedestal mounted crane

The first mentioned 40 tons pedestal mounted wire luffing cranes are mainly used on standard cargo ships like self-unloading container ships. The most differences can be found in boom lengths and hoisting speeds. Only small differences can be distinguished, positive differences are the 32m outreach of the Liebherr crane. And the hoisting speed of the TTS crane of 50 m/min. A total overview of specifications of 40 tons cranes can be found in table 0.3.

	Load at maximum radius	Radius	Boom length	Hoisting speed
Energy Cranes EC900	40t@20m	8 - 54m	36,6m	-
Favelle Favco 15/10k	40t@25m	-	32m	46m/min
Huisman 40t	40t@23m	6,5 - 38,7m	38,7m	16m/min
Liebherr CBB350	40t@32m	-	-	-
TTS V-type	40t@28m	6 - 28m	28m	50m/min
TTS KS-type	40t@28m	2,8 - 32m	32m	40m/min

Table 0.3: Comparison 40-ton pedestal mounted wire luffing cranes

The heavy lift type cranes have the same differences, although the hoisting speed is of less importance due to the heavy lift tasks, which doesn't have to be done very fast. Table 0.4 contains an overview of 300 tons cranes of the different companies.

	Maximum load	Boom length	Hoisting speed
Energy Cranes EC1200	283t	24,4-67,1m	-
Favelle Favco PC300	300t	36,6-50,4m	-
Huisman 300t	300t	45,7m	3 - 6m/min

Table 0.4: Comparison 300-ton pedestal mounted wire luffing cranes

The last type mentioned is the cylinder luffing crane. Also a few minor differences are notable, the TTS crane has the longest boom. The MacGregor has the highest hoisting and slewing speeds. Other specifications can be found in table 0.5 below.

	Maximum load	Boom length	Radius	Hoisting speed	Slewing speed	Weight
Energy Cranes EC75	40t	27,4m	2,5-36m	-	-	-
MacGregor LCS4028-2	40t	28m	2,4-32m	22 - 35m/min	0,9rpm	52t
TTS CCL 40t	40t	32m		12,5 - 30 m/min	0,7rpm	64t

Table 0.5: Comparison 40-ton pedestal mounted cylinder luffing cranes

The last type is the so called knuckle jib crane (figure 0.3) consist of a boom with hydraulic cylinders and different mast parts. Because the boom can knuckle the advantage is the suspension point which can ideal being positioned at a limited height above deck. The disadvantage is the limited capacity, due to the limited forces which can be generated with the hydraulic cylinders.

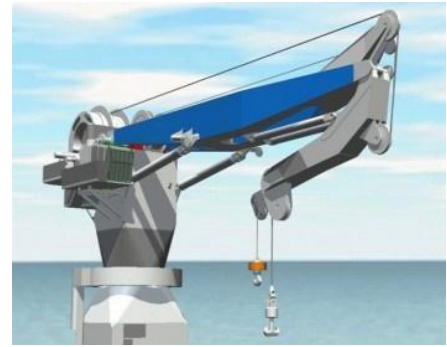


Figure 0.3: Knuckle boom crane

Because of the lack of listed specifications, no comparison can be made. Only Huisman and TTS are offering this type of cranes. Huisman is specialized in the higher capacities, TTS in the standard cargo knuckle jib cranes.

### Heavy lift offshore cranes

The current available cranes can be divided into two groups, the fully revolving cranes and the sheerlegs. The fully revolving cranes mainly being used for offshore installation at sea. The sheerlegs mainly being used in protected areas, like harbours.

The fully revolving crane is a crane which can rotate 360 degrees. The largest are placed on so called SSCVs for extra stability during the hoisting activities. This type of cranes is also be placed on barges and vessels, sometimes combined with a pipelaying system.

If we take a look at the largest cranes available over 2500 tonnes fixed capacity, the differences which can be seen are the differences in lifting height and the outreach in case of the maximum capacity being lifted. The Saipem 7000 and Thialf are capable of lifting the heaviest loads, the differences are the lifting capacity of the Thialf being 14200 ton, where the Saipem 7000 can only lift 14000 ton. On the other hand the Saipem 7000 is capable of lifting its maximum capacity at 41m or at a height at 110m. Where the Thialf can only lift its maximum capacity at 31,2 meter at a height of 95m. Other specifications of the cranes are available in table 0.6.

	Max. capacity fixed [ton]	Max. capacity revolving [ton]	Outreach max. capacity [m]	Lifting height [m]	Ship type
Thialf [2]	14200	7100	31,2	95	SSCV
Saipem 7000 [2]	14000	7000	41	110	SSCV
Hermod [2]	8165	4536/3629	40/39	85/95	SSCV
Lan Jing	7500	4000	100	110	DV
Balder [2]	6350	3629/2722	38/30	98/116	SSCV
Qadir 5000	4400	3000	-	95	DV
Hua Tian Long	4000	2000	66	95	DV
DB 50	3992	3199	37 / 25	80	DV
Lan Jiang	3800	2500	44	-	DLV
DB 101	3175	2449	35	82	SSCV
DB 30	2794	2086	-	71,6	DLB
LTS 3000	2722	1996	27	75	DLV
Sapura 3000	2700	1996	31 / 27	70m	DLV

Table 0.6: Main floating heavy lift cranes over 2500 ton with their main specifications

The sheerleg crane has no revolving capability, only a frame which can be luffed to different heights. This type of cranes has a range which is very wide, sheerlegs of only 40 tons can be found in small harbours, but currently a 8000 tons sheerleg is being built, which will be the largest worldwide.

The sheerleg cranes over 2500 ton are also quite different. The maximum outreaches differ between 12 and 55m, the lifting heights between 77 and 133m. Table 0.7 contains an overview of the sheerlegs over 2500 ton available today, with their technical specifications.

	Maximum capacity [ton]	Outreach maximum capacity [m]	Lifting height [m]	Maximum outreach [m]	Maximum Outreach capacity [ton]
HL5000	5000	31	77	73	1500
Zhenhu 7	4000	42	110	80	550
Musashi	3700	26	102	-	400
Rambiz	3400	12	78	67	250
Fuji	3000	38	133	-	-
Si Hang Fen Jin	2600	34	80	75	750

Table 0.7: Sheerleg cranes over 2000 ton with their main specifications

Chart 0.1 below contains a collection of load charts of revolving cranes over 2500t, combined into one load chart. Chart 0.2 contains the collection of sheerleg cranes over 200t.

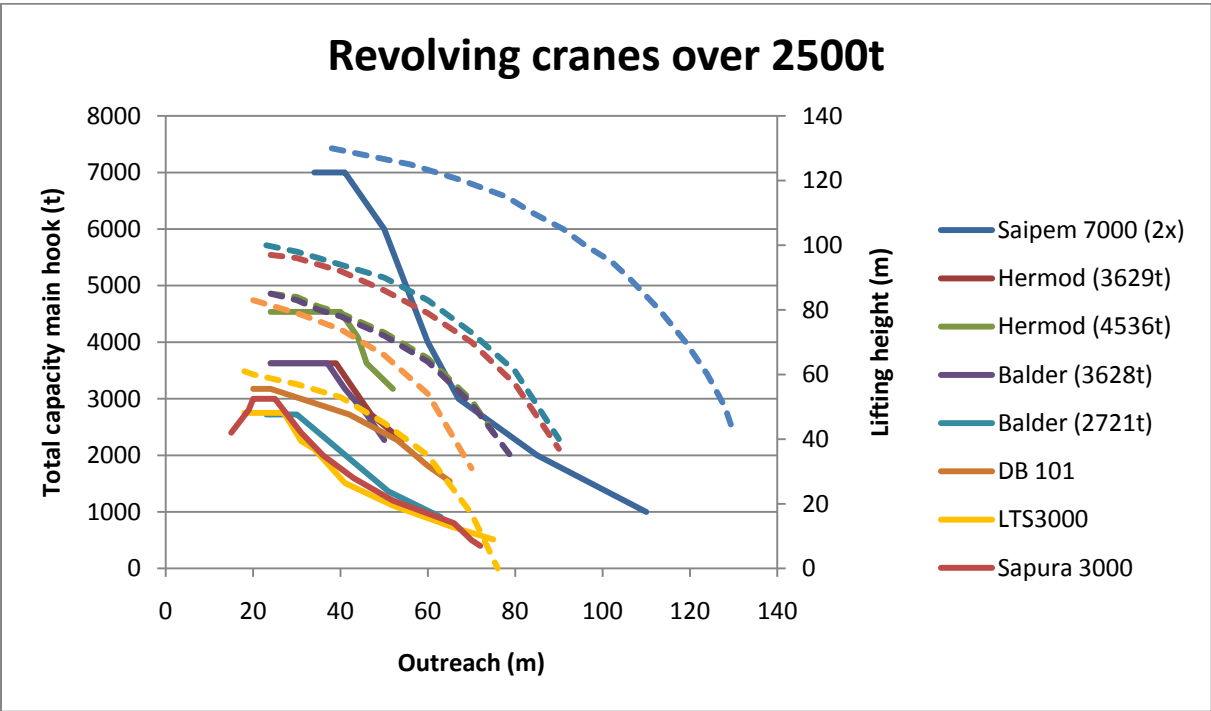


Chart 0.1: Collection load charts revolving cranes over 2500t

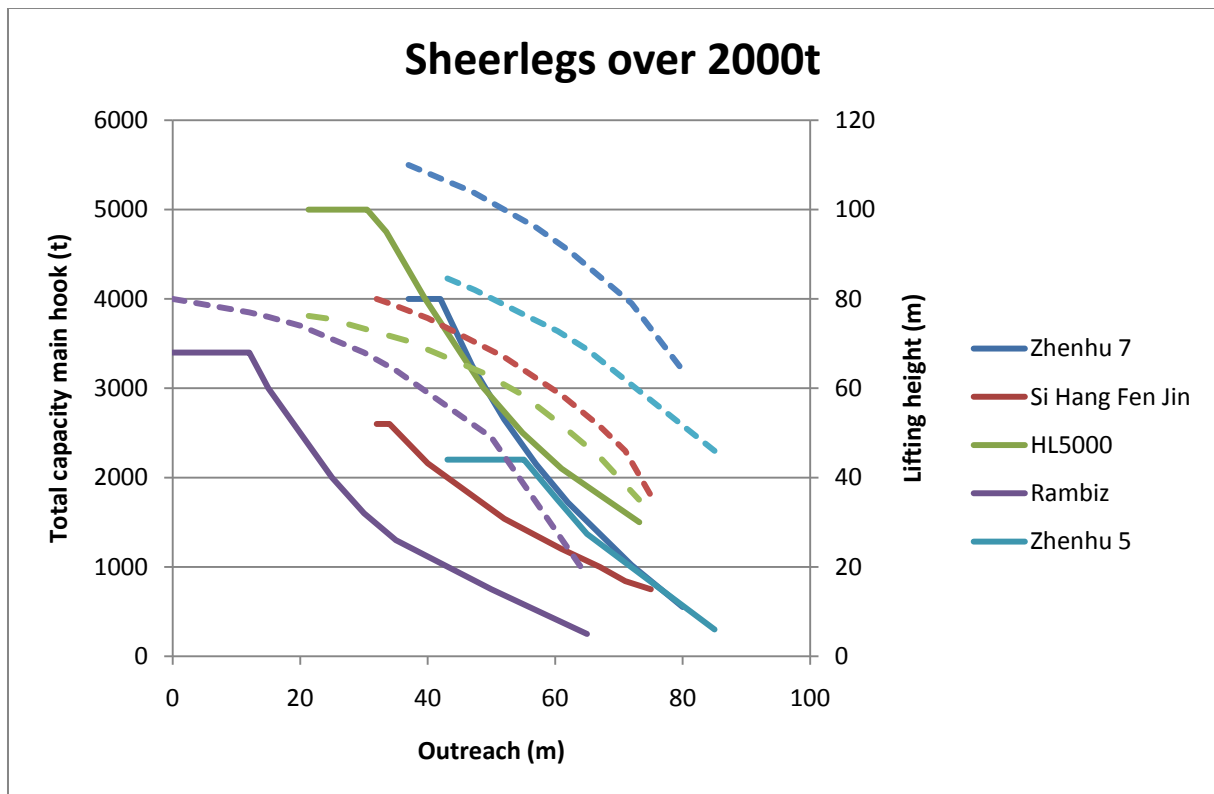


Chart 0.2: Collection load charts sheerleg cranes over 2000t

### Specials

Also some special lifting ships are being specified. The Ostrea is be able to lift 12500 ton, specially constructed for the construction of the Eastern Scheldt Storm Surge Barrier. This vessel is only capable of lifting in between its two floats.

The other vessel Svanen is being constructed for the construction of the West Bridge in Denmark. The ship is currently being able to lift 8700t, due to its upgrade to be able to build the Confederation Bridge in North America.

Two other specials, the MPHLV and the Pieter Schelte are not yet build. But with their lifing capacities they will be able to lift complete parts of drilling platforms. They are expected to be in use early 2013.