Summary

In this report, the results of a literate research on the world wide offer of construction cranes are discussed. At the moment of writing the entire construction crane market can be divided into four different cranes types:

- Self-erecting cranes;
- Flat-top cranes;
- Top slewing cranes;
- Luffing jib cranes.

Based upon an analysis of the characteristics of the four types of cranes a table, Table 1, is constructed. This table specifies which crane is most suitable for what type at different conditions.

	Environment				Loads		Installation		
	Suited for small areas?	Height limitations?	Working area limitations?	Impact on building foundation?	Jib reach	Maximum load	Mobility during work	Erection time	Installation cost
Self-erecting crane	+/-	+	--	++	+	-	++	++	++
Flat-top crane	++	++	+	+	+	+/-	+/-	+	+
Top slewing crane	+	-	-	-	++	++	+/-	-	-
Luffing jib crane	++	-	++	-	+	+	+/-	-	-

Table 1 Comparison table for different construction crane

Currently, about 37 manufacturers worldwide offer construction cranes. Large manufacturers have the ability to supply all four different types, the small manufacturers only one or two types.
A large amount of construction crane manufacturers have their head office in Europe, where Italy, Germany and Spain accommodate the largest amount. It is remarkable that only four Chinese companies are present at the construction crane market. Possible reasons for this could be the safety and design requirements that are requested in a lot of countries.

Besides the well known residential and commercial building construction, construction cranes are used for three other different construction sites. These sites are:

- Shipyards and harbors
- Cooling towers
- Dams and bridges

These different construction sites require different lifting properties. Residential and commercial buildings usually requires fast operation at a reasonable maximum load (up to 32mT for large construction sites). All types of construction cranes can be found on residential and commercial building construction sites.
Top-slewing cranes have a monopoly position when it comes to Shipyards and harbors. Construction cranes that work at harbors and shipyards require a large jib reach and a high maximum load, compared to other construction cranes. The top-slewing cranes, suited for harbor and shipyard operation, combine large maximum loads (up to 100mT) with a large jib reach (up to 100m).
Due to the hyperbolic shape and large height, cooling towers require a crane that has a large height under hook, can adapt to the changing geometry and still has enough lifting capacity to lift loads up to 35mT. So called articulated luffing jib cranes and standard luffing cranes have shown to be a good solution for this problem. While sometimes flat-top cranes and top-slewing cranes are used, the articulated and standard luffing cranes have a major advantage. These luffing jib cranes use the construction of the cooling tower as a cover and so minimize the amount of wind forces acting at the crane. This allows an installation of a smaller crane..
Dams and bridges require large load capacities and a large height under hook. Although flat-top cranes are used from time to time, top-slewing cranes and luffing jib cranes are favored. Top-slewing cranes are mostly used for situations that require a large area coverage while luffing jib cranes are used for lifting heavy loads, for example sections of bridge pylons.

Besides crane sales, crane rental has become more and more popular among contractors and manufacturers. For manufacturers the rental of cranes gives them a more steady income which flattens out the large peaks that are present in crane sales. For contractors, crane rental has become very popular as they do not need to worry anymore about storage and maintenance.
The construction crane market around the world is very diverse. Western countries show steady request for construction cranes which is mostly based on the request for domestic and commercial housing. Third world countries, former communist countries show the opposite. Countries which host important events like the FIFA World Cup and the Olympics require a lot of construction activity which is a potential for an increasing demand in construction cranes. The construction activity in the Middle East and the related construction crane market is mostly driven by the income from gas and oil.

As the offer of construction cranes in quite large, only a selection of self-erecting cranes, flat-top cranes, top-slewing cranes and luffing jib cranes are discussed in this report. The discussion is based on technical specifications and, when present, innovative solutions existing on the discussed model. A summary of the discussed cranes together the five main lifting details (maximum load, maximum tip load, maximum load capacity, maximum jib length and maxim height under hook) can be found in Table 2.
The self-erecting crane market is quite large with sixteen small and large manufacturers. This is probably caused by the rather low purchase and maintenance prices of these cranes which results in a rather large demand. The self-erecting cranes are available with a trailer mounted, truck mounted or crawler mounted undercarriage. The erection mechanism is either a hydraulic or rope wire-winch operated erecting system. The self-erecting cranes are available in a maximum load range between 0.7-18.0mT.
The flat-top crane market is quite large, just like the self-erecting crane market and consist of seventeen manufacturers. Almost every manufacturer has a light load crane range and a heavy load crane range. The light load range is typically a crane with a maximum load between 2.0-6.0mT. This crane is ideal for urban operation with minimum space and rather light construction material. The heavy load range is a crane with a maximum load between 6.0-18.0mT. This type of crane is suitable for large construction sites, like commercial buildings or high rise residential buildings, with large loads (for example: large wall sections of pre-casted concrete). The strongest flat-top crane has a maximum load of 48mT and is supplied by Linden Comansa. In July 2009, the first delivery was made to help dismantling an oven at a Ukraine steel foundry.
When it comes to top-slewing cranes, manufacturers also tend to have two types: a top-slewing crane suitable for medium (50.0mT) construction activities and a top-slewing series suitable for heavy lifting (up to 80mT). Besides these ranges also an ultra heavy lifting range (up to 400mT) exists. This range is only supplied by Krøll. The medium range of top-slewing cranes can be found at all kinds of construction sites varying from residential and commercial construction to construction of cooling towers to dams and bridges. The heavy range of top-slewing cranes can be found at industrial construction sites like refineries, steel foundries and power plants. The heavy range is also used for lifting construction materials at shipyards and harbors.
Compared to other types of construction cranes, not many manufactures supply luffing jib-cranes and not a large number of models are currently present at the luffing jib market. Unlike flat-top cranes and top-slewing cranes, a lot of different designs currently exist at the luffing jib crane market. This large difference is mainly causes by the many different views of the manufactures have led to a large variety in designs. Overall, luffing cranes have the following options:

- Articulated or one section jib
- Fixed or movable counterweight
- Rope wire-winch operated or hydraulic operated luffing system

As with flat-top cranes and top-slewing cranes, luffing jib cranes also have a division of cranes in a light to medium range and a heavy range. The light to medium range has a maximum load between 4.0-32.0mT. The heavy range has a maximum load range between 32.0-80.0mT. Only Favelle Favco offers a heavy lift luffing jib crane with a maximum load of 330mT.

Manufacturer	Model	Maximum load [mT]	Maximum tip load [mT]	Maximum load capacity [mT·m]	Maximum jib length [m]	Maximum height under hook [m]
Self-erecting cranes						
Gelco	G TTs	1.2-1.5	0.6-0.7	10.2-18.8	17.0-25.5	21.0-29.5
	G TT BE	1.2-1.5	0.6-0.7	10.2-18.8	17.0-25.65	23.2-32.5
Liebherr	H	1.5-4.0	0.5-1.1	14.0-39.6	22.0-30.0	21.3-29.0
	HM	1.5-2.0	0.5-0.7	14.0-24.0	22.0-27.0	21.3-33.4
	K	2.5-8.0	1.0-1.45	30.0-72.5	26.0-50.0	37.0-54.8
	MK	8.0	1.8-2.05	72.0-117.6	36.0-52.0	47.9-68.0
	TT	4.0	1.1	44.8	30.0	31.5
Manitowoc Potain	Igo	1.3-6.0	0.65-1.25	52.0-76.2	16.0-45.0	16.0-51.0
	HDT	6.0	1.35	79.8	45.0	53.7
	GTMR	4.0-8.0	1.2-1.5	52.0-104.8	35.0-50.0	42.3-49.4
Spierings	SK377-AT3	7.5	1.9	80.3	33.0	35.7
	SK 498-AT4	8.0	1.9	102.8	44.0	46.5
	SK 599 AT5	9.0	1.9	117.0	50.0	56.3
	SK1265-AT6	10.0	1.7	132.0	60.0	64.2
	SK2400-AT7/R	18.0	5.0	243.0	42.0	56.0
Flat-top cranes						
Liebherr	EC-B	2.5-6.0	1.0-1.5	34.5-112.2	30.0-60.0	31.1-67.5
	EC-B Litronic	6.0-12.0	1.85-2.25	145.8-226.8	60.0-70.0	63.1-84.9
Linden Comansa	LC 500	4.0-5.0	1.0	43.5-61.0	35.0-50.0	48.7-51.7
	LC 1100	5.0-8.0	1.2-1.7	76.8-118.4	52.5-65.0	47.2-59.2
	LC 2100	12.0-48.0	2.2-6.5	181.8-705.6	60.0-80.0	64.7-80.7
Manitowoc Potain	MCT	2.5-5.0	1.05-1.2	51.5-68.5	41.0-52.0	38.4-39.7
	MDT	6.0-16.0	1.2-3.0	103.8-256.0	55.0-75.0	54.3-93.7
Top-slewing cranes						
GG Crane Group	GG crane	8.0-16.0	1.7-4.3	200.0-480.0	2x65.0-2x85.0[1]	Unknown
Krøll	Standard	5.0-30.0	1.2-4.0	63.5-633.0	45.0-90.0	41.0-92.0
	Maxi range	30.0-400.0	9.0-200.0	840.0-228000.0	78.0-100.0	84.0-100.0
Liebherr	EC-H Litronic	8.0-50.0	1.85-5.8	116.0-590.0	55.0-81.5	68.0-92.9
	HC	20.0-80.0	5.0-42.0	720.0-4620.0	79.6-100.0	78.8-110.0
Manitowoc Potain	Maxi MD	12.0-25.0	3.0-3.65	280.8-357.5	75.0-80.0	68.9-92.5
	Topkit MD	10.0-16.0	2.0-2.85	151.0-260.8	62.5-70.0	61.4-73.2
	Maxi Topkit	40.0-80.0	4.6-38.7	532.0-2960.0	70.0-85.0	80.2-105.9
Luffing jib-cranes						
Cobra Crane	50m/60m	12.0	4.5	240.0-270.0	2.0-60.0	48.0-112.0
Favelle Favco	M2408D	330.0	20.6	4785.0	4.7-91.3	170.0
Jost	JL	16.0-32.0	2.0-9.1	248.0-742.4	2.6-60.0	102.0-108.0
	JTL	4.0-12.0	1.5-2.6	85.6-231.6	5.1-25.0	66.0-88.0
Liebherr	DR	10.0	7.5	190.0	5.1-25.0	317.0-633.0
	HC-L	12.0-54.0	1.9-4.2	174.0-669.6	3.0-65.0	87.0-435.0
Wilbert	WT	12.0-80.0	2.0-19.0	336.0-1960.0	3.0-78.0	210.0-900.0

Table 2 Summary of discussed construction cranes

[1] Shorter and larger jib lengths are possible but information about the capabilities of the GG crane at these jib lengths is not available yet.