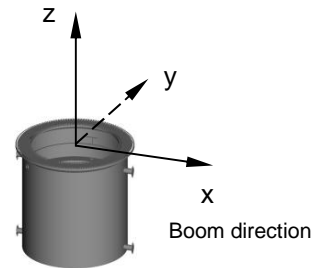


REACTIONS TO FOUNDATION (RTF)

- 1. Design Code:** API 2C, 7th Edition, Specification for Offshore Pedestal Mounted Cranes, 2012
- 2. Installation type:** floating
- 3. Category of loads:**
- A. Regular loads:
- | | |
|---|---|
| Dead loads | included |
| Duty- / Dead load- / Amplification factor | included |
| Rated capacity | included |
| Mass forces due to slewing and boom luffing | included |
| Mass forces due to crane base acceleration | included |
| Static crane inclination | longitudinal included
transversal included |
| Out of plane influences (Off- / Sidelead) | included |
- B. Occasional loads:
- | | |
|-----------------------|----------|
| In service wind loads | included |
| Ice loads | excluded |
- 4. Reference level** Interface between top of pedestal and slew bearing
- 5. Design method** WSD - Working Stress Design (or Allowable/Permissible Stress Design)
Forces and moments are characteristic loads without partial safety factor.



6. RTF - Table

- M_{x+y} given in the following table to be fully rotated around z-Axis.
- F_{x+y} given in the following table to be considered to increase M_{x+y} .

6.1. Excluding additional pedestal factor

	Included loads	Maximum forces		Maximum moments	
		F_{x+y} [kN]	F_z [kN]	M_{x+y} [kNm]	M_z [kNm]
Case 1	Regular loads only	295	-1800	25810	4100
Case 2	Regular and occasional loads	320	-1800	26000	4600

6.2 Including additional pedestal factor

	Included loads	Maximum forces		Maximum moments	
		F_{x+y} [kN]	F_z [kN]	M_{x+y} [kNm]	M_z [kNm]
Case 1	Regular loads only	360	-2050	35000	5600
Case 2	Regular and occasional loads	380	-2050	35500	6100

Note: Additional design factor according to:

Design Code: API 2C "Specification for Offshore Pedestal Mounted Cranes", 2012, Section 6.2

Pedestal factor: 1.5

7. Failure load for Failure Mode Analysis

Failure criteria: Plastic bending and buckling of pedestal cross section with safety against yielding 1.0 and safety against buckling 1.0.

Forces		Moments	
F_{x+y} [kN]	F_z [kN]	M_{x+y} [kNm]	M_z [kNm]
810	-4570	66000	11675

18.08.2015	LWN	Reactions to Foundation	Moeller	Butscher
Date	Work	Description	Prepared	Approved

CRANE IN STOWED CONDITION - REACTIONS TO FOUNDATION (RTF)

In the following report, the crane structure is examined under consideration of loads in stowed condition and the RTFs for the interfaces

a.) Slewing unit - Pedestal
b.) Boom - Boom rest are given.

1. Loads

1.1 Category of loads

A. Regular loads:	Static loads:	Dead loads	included
		Static crane inclination	included
		longitudinal	included
		transversal	included
	Dynamic loads:	Mass forces due to crane base acceleration	included if applicable
B. Occasional loads:		In service wind loads	included
		Ice loads	included if applicable

1.2 Load combinations

Static loads:		Static loads
Dynamic loads:	Case 1:	Static and dynamic loads
	Case 2:	Static, dynamic and occasional loads

2. Design method WSD - Working Stress Design (or Allowable Stress Design)

3. Environmental conditions

Condition:	[-]	Transit	Survival	Accidental	
Mean windspeed: v	[m/s]	63	63	63	
Static inclination:	Longitudinal to boom (x)	5	5	30	
	Transversal to boom (y)	5	5	30	
Accelerations:	Longitudinal to boom (x)	1.67	4.91	4.91	
		[g]	0.17	0.50	0.50
	Transversal to boom (y)	1.67	4.91	4.91	
		[g]	0.17	0.50	0.50
	Normal to deck (z)	2.06	9.81	9.81	
		[g]	0.21	1.00	1.00
Ice load:	Ice thickness	0	0	0	
	Ice density	[kg/m ³]	0	0	0
Snow load:	Snow thickness	0	0	0	
	Snow density	[kg/m ³]	0	0	0

Remark: - The given accelerations are the maximum accelerations that occur at:

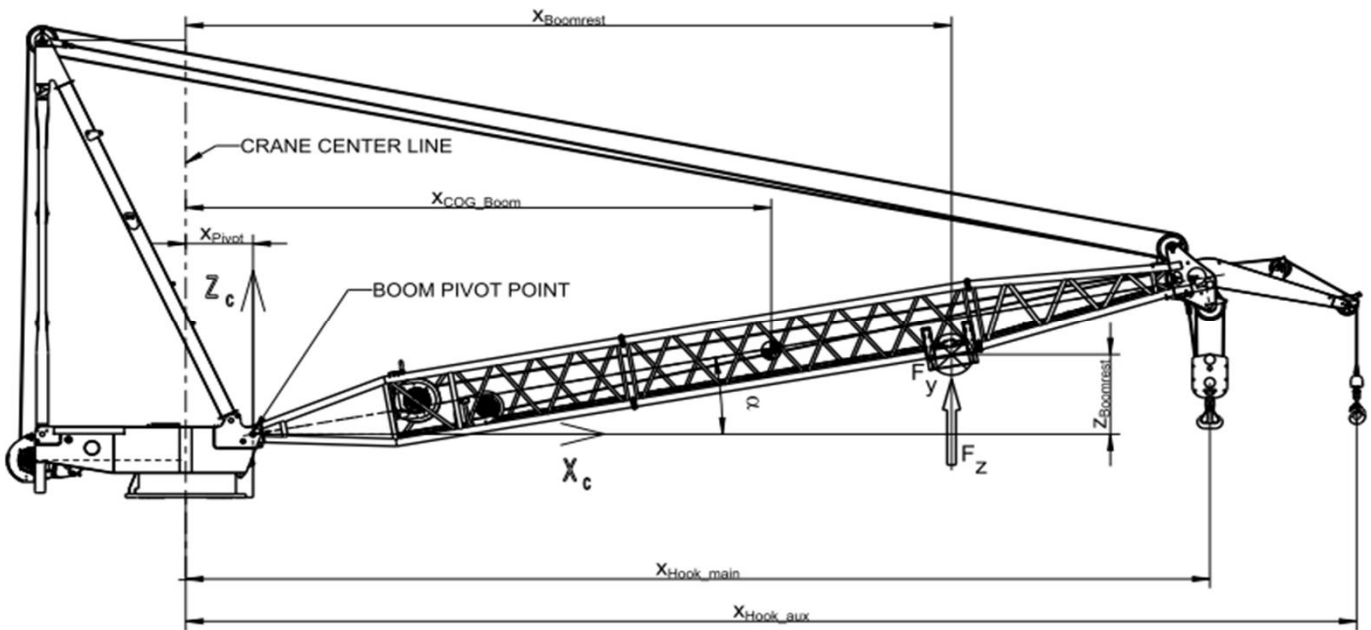
- the COG position of the slewing unit
- the COG position of the boom
- the main boom head position

4. Boom rest position

Center of boomrest:	horizontal position (from crane center line)	x_Boomrest	[mm]	29340
	vertical position (from boom pivot point)	z_Boomrest	[mm]	-1110
Boom angle:	in stowed condition	α	[°]	0

19.08.2015	LWN	Reactions to Foundation	Moeller	Burtscher
Date	Work	Description	Prepared	Approved

5. Crane Data



Boom length (main hoist):		[mm]	39000
Position of boom pivot point:	x_{Pivot}	[mm]	2300
	z_{Pivot}	[mm]	2533
COG boom:	$x_{\text{COG_Boom}}$	[mm]	18376
Hook position (boom in stowed condition):	$x_{\text{Hook_main}}$	[mm]	41300
	$x_{\text{Hook_aux}}$	[mm]	45920
Slewing unit weight (incl. ropes):	m_{SU}	[t]	66.8
Boom weight (incl. ropes):	m_{Boom}	[t]	39.9
Hook weight:	$m_{\text{Hook_main}}$	[t]	1.0
	$m_{\text{Hook_aux1}}$	[t]	0.6

Remark:

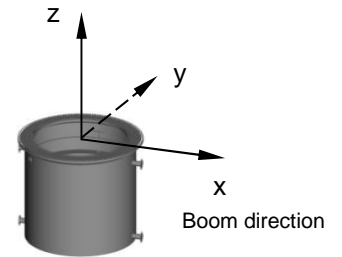
- Hooks must be secured against horizontal accelerations by one of the following options:
 - lashing
 - stowing in hook garage
 - stowing in hook cradle on deck
 - Never pre-tension hooks in vertical direction against deck.
- Damage due to deflection of installation in combination with a locked vertical degree of freedom may occur !

6. RTF - Forces and moments

6.1. Slewing unit - Pedestal

Reference level: Interface between top of pedestal and slew bearing

Condition:		[-]	Transit	Survival	Accidental
Static loads:	F_{x+y}	[kN]	587.8	587.8	705.9
	F_z	[kN]	805.8	805.8	805.8
	M_{x+y}	[kNm]	346.8	346.8	348.1
	M_z	[kNm]	0.0	0.0	0.0
Dynamic loads: Case 1:	F_{x+y}	[kN]	698.6	914.2	994.3
	F_z	[kN]	975.1	1611.7	1611.7
	M_{x+y}	[kNm]	427.9	722.4	736.7
	M_z	[kNm]	0.0	0.0	0.0
Dynamic loads: Case 2:	F_{x+y}	[kN]	698.6	914.2	1023.3
	F_z	[kN]	975.1	1611.7	1611.7
	M_{x+y}	[kNm]	466.9	764.1	799.1
	M_z	[kNm]	0.0	0.0	0.0



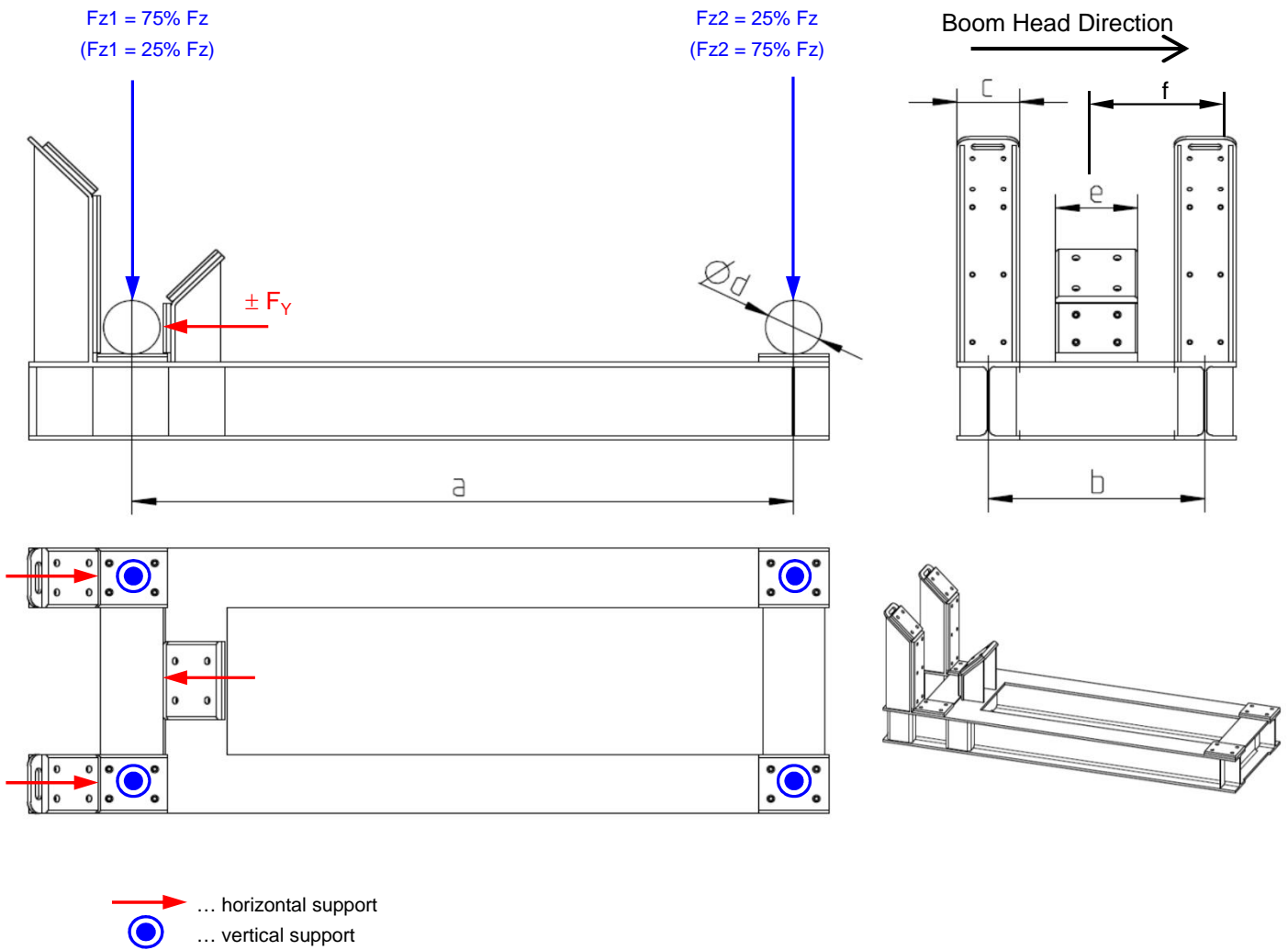
6.2. Boom - Boom rest

Reference level: Interface between boom rest upper part construction and boom

Condition:		[-]	Transit	Survival	Accidental
Static loads:	F_x	[kN]	51.3	51.3	51.3
	F_y	[kN]	23.4	23.4	134.1
	F_z	[kN]	256.4	256.4	256.4
Dynamic loads: Case 1:	F_x	[kN]	62.0	102.5	102.5
	F_y	[kN]	69.0	157.6	268.3
	F_z	[kN]	310.2	512.7	512.7
Dynamic loads: Case 2:	F_x	[kN]	62.0	102.5	102.5
	F_y	[kN]	146.4	234.9	345.6
	F_z	[kN]	310.2	512.7	512.7

Remark: - Horizontal Force at boom rest F_x : Friction due to relative movement between boom and support, $\mu = 0.2$

7. Details of boom rest upper part construction:



Boom width:	a	[mm]	2600
Boom Rest width:	b	[mm]	1070
Width of outer horizontal protection:	c	[mm]	300
Outer diameter of chord members:	d	[mm]	219.1
Width of inner horizontal protection:	e	[mm]	400
	f	[mm]	535

Remark:

- Horizontal Support must be located on Non-Walkway-Side. No horizontal support allowed on boom walkway side.
- LIEBHERR recommends to finally locate the upper part construction during crane assembly on the installation.