



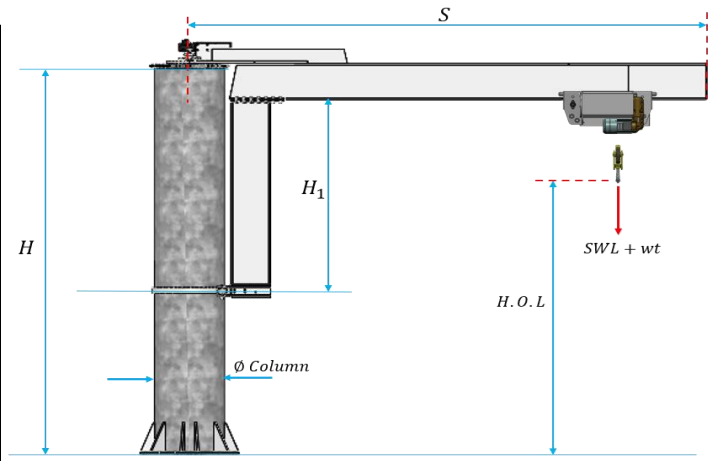
CALCULATION

JIB CRANE

Project Name :	JIB Crane	Rev. :	A
Tag Number :	KAMARKHANI	Date :	SK CRANE

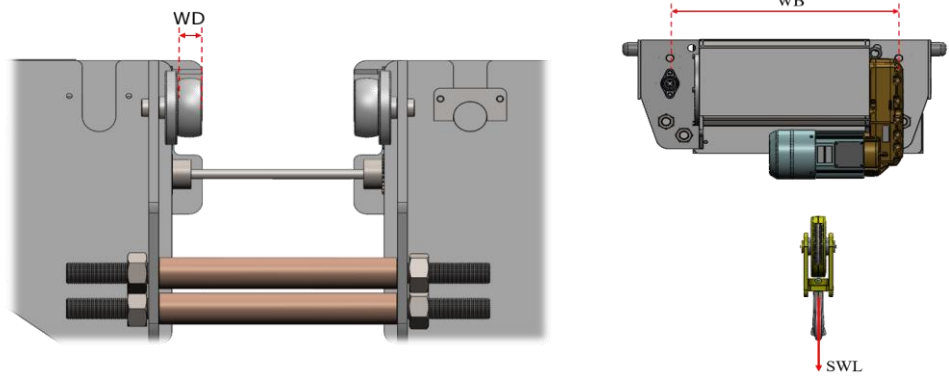
STEP 1 : GENERAL DATA JIB

WG	M5	Working Group	ISO
Q	1	Safty Working Load (t)	t
S	12	Span (m)	m
SF	1.25	Safty Factor	---
ϵ	1	Dynamic factor	--
HOL	5	Lifting Height (mm)	m
$\emptyset$	1200	Diameter Column (mm)	mm
THK	10	Thickness Column (mm)	mm
H	5000	Height Column (mm)	mm
E-C	210	Young Modulus Column (Mpa)	MPA
Fy	230	Yield stress Material	MPA
H1	1500	Height Base Column Boom	mm



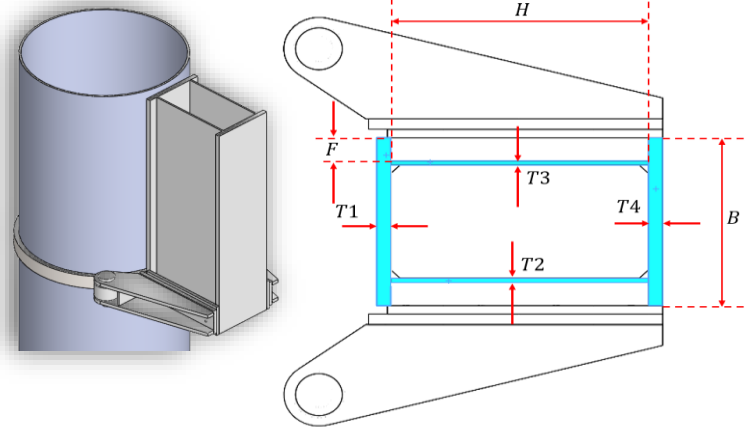
STEP 2 : TROLLEY HOIST DATA

WT	900	Weight Trolley	KG
NW	4	Number Wheel Trolley	---
WB	1200	Wheel Base	mm
WD	35	Width Wheel	mm
HS	5	Hoist Speed	m/min
TLS	16	Traversing Speed	m/min
DD	320	Diameter Drum	mm



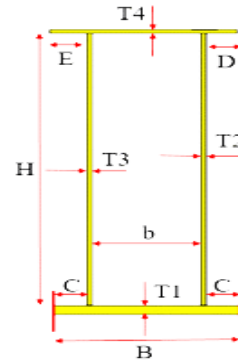
STEP 3 : BASE COLUMN BOOM

H	100	Height Web	mm
B	250	Width Top & Bottom Flange	mm
T1	10	Thickness Bottom Flange	mm
T2	6	Thickness Web 1	mm
T3	6	Thickness Web 2	mm
T4	10	Thickness Top Flange	mm
C,D,E	50	Space Flange	mm



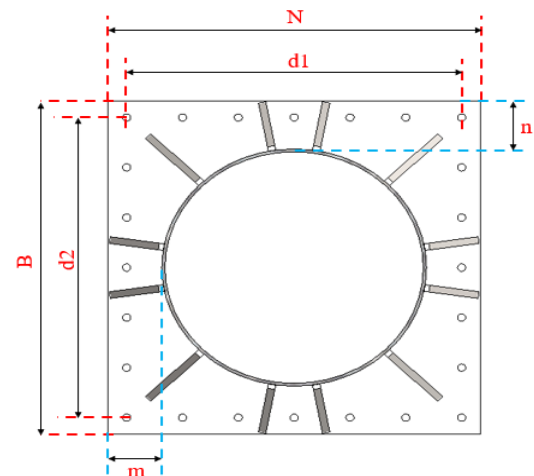
STEP 4 : BOOM DATA

H	350	Height Web	mm
B	300	Width Top & Bottom Flange	mm
T1	20	Thickness Bottom Flange	mm
T2	8	Thickness Web 1	mm
T3	8	Thickness Web 2	mm
T4	10	Thickness Top Flange	mm
C,D,E	55	Space Flange	mm
DD	1800	Distance Diaphragm	mm
TD	8	Thickness Diaphragm	mm



STEP 5 : BASE PLATE DATA JIB

Material Properties			
f_c	240	Specified compressive strength of concrete	Mpa
ϕ_c	0.65	Strength reduction factor for concrete , DF= (0.65)	---
F_y	240	yield stress for base plate material	Mpa
E_y	210	Modulus of elasticity of steel (base plate)	Mpa
ϕ_s	0.9	Resistance factor for flexure of steel DF= (0.9)	----
F_{EXX}	200	Electrode tensile strength	Mpa
H	1000	Height foundation	mm
Pedestal Properties			
N	1200	Base plate length	mm
B	1200	Base plate width	mm
N_p	1200	Pedestal length along N	mm
B_p	1200	Pedestal width along B	mm
Bolt Properties			
d_b	30	Bolt diameter	mm
N_b	14	Number of bolts	---
d_1	1000	Distance between anchor bolts along N	mm
d_2	1000	Distance between outer anchor bolts along B	mm
μ	0.55	Friction coefficient for steel on grout (0.55)	mm
Z	50	Distance Blote to edge base plate	mm





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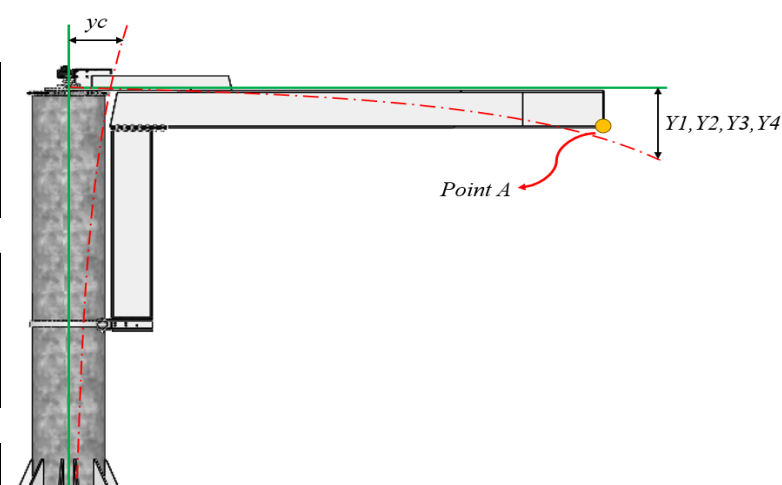
JIB DEFELECTION CHECK

Y_{DF}	215.8	Deflection Due to Dead Weight	mm
Y_{LF}	167.7	Deflection Due to live Weight	mm
Y_{Span}	9.7	Deflection at the end of the span	mm
Y_{Max}	393.2	Total Deflection	mm

Y_1	3.7	Couple rise resulting from dead load (A)	mm
Y_2	215.8	Bridge rise due to dead load (A)	mm
Y_3	9.7	Couple rise resulting from live load (A)	mm
Y_4	151.4	Bridge rise resulting from live load (A)	mm

YC	2.0	Horizontal rise above the column	mm
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CMAA	S/250	NO
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DIMENSION CHECK BOOM BOX

$S/H < 25$	34.29	NO	CMAA
$S/B < 65$	40.00	OK	CMAA
$1.6 < H/B < 2.7$	1.17	OK	CMAA
$b/T4 < 39$	17.40	OK	CMAA

Moment of inertia Boom Box		
I_x	337688242	mm^4
I_y	113903466.7	mm^4

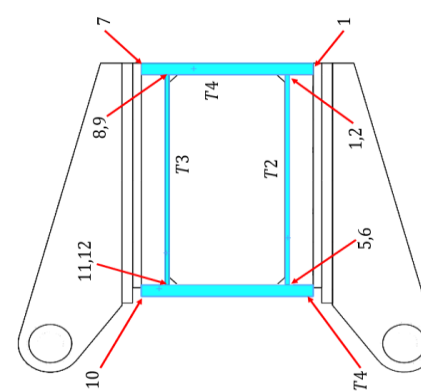
DIMENSION CHECK BOOM BOX

MDL	2.1E+04	Dead Load
MTL	2.6E+04	Trolley Load
MLL	1.2E+05	Lifting Load
MH	1.8E+04	Inertia Forces From Drives
Unit = (N.m)		

Point	σ_x (total)	UNIT
1	207	MPA
2	161	MPA
3	161	MPA
4	207	MPA
5	161	MPA
6	161	MPA
7	207	MPA
8	161	MPA
9	161	MPA
10	207	MPA
11	161	MPA
12	161	MPA

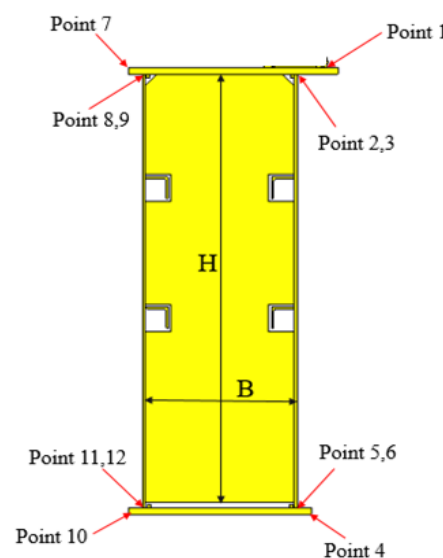
Moment of inertia Base Column Boom		
I_x	16166666.67	mm^4
I_y	32266066.67	mm^4

$H1/H < 25$	8.00	OK	CMAA
$H1/B < 65$	8.00	OK	CMAA
$1.6 < H/B < 2.7$	0.40	OK	CMAA
$b/T4 < 39$	13.80	OK	CMAA



CALCULATE STRESS BOOM BOX JIB

Point	σ_{x1}	σ_{x2}	σ_{x3}	σ_x (total)
1	-125	-22	0	-146
2	-119	-14	0	-133
3	-119	-14	0	-133
4	87	22	26	134
5	76	14	-21	69
6	76	14	-21	69
7	-125	-22	0	-146
8	-119	-14	0	-133
9	-119	-14	0	-133
10	87	22	0	134
11	76	14	0	89
12	76	14	0	89



Shear stress Boom Box

τ	3.30	Mpa
OK		

Stress Boom Box

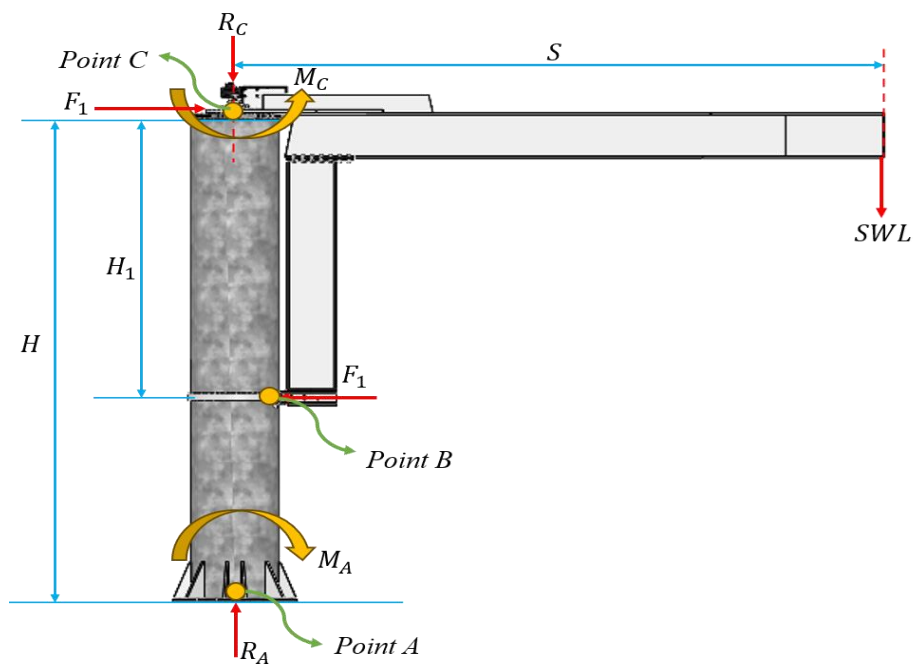
σ_x (total)	134.20	Mpa
OK		



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CALCULATE FOR BOOM BOX

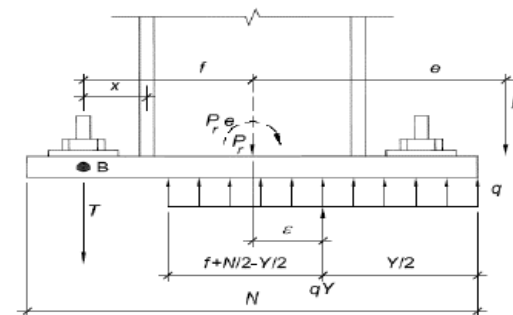
MA	2.6E+05	Moment Bending Point A	N.M
MC	2.6E+05	Moment Bending Point C	N.M
F1	130678.6	Horizontal Force Point B	N
RA	43775.7	Vertical Force Point A	N
RC	4317.3	Vertical Force Point C	N

SPECIFICATION BASE PLATE JIB CRANE

m	90.0		
X	-95.0	plate tension interface cantilever parallel tomoment directi	mm
e	3494.8	Actual eccentricity	mm
A1	1.4E+06	Area of base plate	mm^2
A2	1.4E+06	maximum area of portion of supporting surface	mm^2
qMax	146880.0	Allowable bearing stress of	Mpa
f	500.0	Distance between Center Column to Bolt N	mm
f+N/2	1100.0		mm
XB	2720.8		mm
Y	1.2	bearing length	mm

TP	9.2	mm	Base plate thickness
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(e) allowable	OK
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CALCULATION ANCHOR BOLT

Vv	6.3E+04	Horizontal Force	N
Vub	4471.9	Horizontal Force for per Anchor Bolt	N
AB	706.5	Area Anchor Bolt	mm^2
fv	6.3	anchor rod shear stress	Mpa
Ft	47.0	nominal tensile strength	Mpa
Tu	1.3E+05	the required tensile strength f the anchor rods	N
Tub	9409.7	required anchor rod tensile strength	N

Tensile Anchor	OK
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CALCULATION COLUMN JIB CRANE

Section properties

A	37366.0	Cross Section Area	mm ²
W	291.45	Section Weight Per Unit length	kg/m
I	6.6E+09	Moment of inertia	mm ⁴
S	1.1E+07	Section moduls	mm ³
r	420.7	Radius of Gyration	mm

Selection Diameter Column

CF	0	Section is compact	
Fa	9.6	Allowable axial stress - $SR \geq Cc$, $SR \leq 200$	Mpa
Fa	0.0	Allowable axial stress - $SR \geq 200$	Mpa
Fa	18.3	Allowable axial stress	Mpa
Fa (final)	9.6	Allowable axial stress	Mpa
F'ex	7.6	Euler's stress - for the x Direction	Mpa
F'ex	7.6	Euler's stress - for the y Direction	Mpa
Fb	151.8	Allowable Bending Stress	Mpa

Stress Calculation Column

fa	1.3	Axial Stress	Mpa
F_bxu	28.39	Bending stress due to moment about the X axis	Mpa
SR	11.9	Slenderness ratios about the X and Y	---
If SR is >200 a larger section		OK	
Cc	4.2	umn slenderness ratio separating elastic and inelastic buck	----
F_byu	95.44	Bending stress due to moment about the y axis	Mpa

Column is Safe		NO
Ø	1200.0	Diameter Column (mm)
THK	10.0	Thickness Column (mm)

Pu	6.2E+04	Coefficient axial load (N)
Mu	2.2E+05	Coefficient moment (N.m)

SELECTION MOTORS JIB CRANE

Parameter	Description	Power (KW)	Round (RPM)
DHM	Hoist Motor	0.76	4.98
DTLM	Traversing Motor	0.12	36.40
RJIB	Rotation JIB	1.63	1.50

Parameter	Value	Description
S3 - Traversing	0.0	Cyclic duration factor
S3 - Hoist	0.0	Cyclic duration factor
f-T	0.0	Temperature factor
F-H	0.0	Sea level factor
f	0.0	Rolling Friction factor
a	0.0	acc rate traversing
a	0.0	acc rate traveling
Cr- Traversing	0.0	Rotational inertia factor
kt	0.0	acc Torque Factor
ks	0.0	acc Torque Factor
E	0.0	Mechanical efficiency
nf	0.0	Free Running
nr	0.0	Full Load Speed

