DANIELI MORGÅRDSHAMMAR	JOB N° DPC68X01	Doc.: 000-000-375-613 Rev: 00 Page: 1/28
	Customer: BARRAMANSA	

ROLLING MILL CALCULATIONS

FOR ROUNDS

Remarks:

- For rolling sequences see drawing 000-000-361-338
- Calculations consider an average temperature of 1100°C at first stand entry

Rev.	Date	Description	Compiled	Checked	Approved
00	28-03-2023	ISSUED	Ciappa M.	Trevisan M.	

DOCUMENT CONTENTS

Remark:

- R-factor = elongation

1 Gear ratios and motors summarizing table

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 28/03/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-338

STAND NO.	STAND TYPE	GEAR RATIO 1^	GEAR RATIO 2^	MOTOR TYPE	MOTOR POWER (kW)	MOTOR RPM (RPM)
1H	GCC7555	118.730		AC	450	0 /1000 /2000
2V	GCC7555	85.673		AC	450	0 /1000 /2000
3H	GCC7555	118.730		AC	450	0 /1000 /2000
4H/V	GCC6548	74.409		AC	450	0 /1000 /2000
5H	GUC8548	87.594		AC	800	0 /1000 /2000
6H/V	GCC6548	68.825		AC	450	0 /1000 /2000
7H	GUC8548	55.247	73.990	AC	800	0 /1000 /2000
8H/V	GUC8548	43.393	58.768	AC	800	0 /1000 /2000
9H	GUC8548	37.442	49.768	AC	800	0 /1000 /2000
10H/V	GUC8548	27.471	37.083	AC	800	0 /1000 /2000
11H	GCC6548	17.428	26.576	AC	800	0 /1000 /2000
12H/V	GUC8548	13.852	27.600	AC	800	0 /1000 /2000
13H	GUC8548	11.734	22.354	AC	800	0 /1000 /2000
14H/V	GCC6548	9.471	18.603	AC	800	0 /1000 /2000
15H	GUC8548	9.841	19.250	AC	800	0 /1000 /2000

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2 Roll pass design calculations

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 28/03/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-338

SECTION ROLLED : Round 3"
Hot rolling
MATERIAL : High carbon
ROLLING SPEED : 0.69 m/s
AXV : 3272.11 mm²m/s
BILLET SIZE : 182.3 mm SQUARE
BILLET WEIGHT : 2970.0 kg
MAX HEATING CAPABILITY : 80.0 t/h
ROLLING TIME : 118.7 s
INTER BILLET : 15.0 s
PRODUCTION : 80.0 t/h

STAND NO.	ROLL DIA	GAP	GROOVE TYPE	STOCK HEIGHT	STOCK WIDTH	AREA	REDUC TION
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	25.00	BOX	149.00 X	193.64	28502.0	14.0
2V	750.0	18.00	BOX	158.00 X	159.39	24563.0	13.8
3H	750.0	11.80	R.BOX	121.80 X	177.92	18738.4	23.7
4V	660.0	15.00	ROUND	136.00 X	136.12	14532.2	22.4
5H	660.0	10.90	R.OVAL	99.50 X	149.91	11783.6	18.9
6V	660.0	15.00	ROUND	111.00 X	111.00	9676.8	17.9
7H	660.0	10.10	R.OVAL	81.80 X	123.55	7857.7	18.8
8V	660.0	12.00	ROUND	91.50 X	91.49	6575.3	16.3
9H	660.0	6.80	R.OVAL	69.80 X	101.25	5503.4	16.3
10V	660.0	2.78	ROUND	77.49 X	77.49	4716.1	14.3

STAND NO.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	R O L L I N G TORQUE	R O L L I N G POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.11	627.8	3.5	118.730	415	1.163	122.2	1728.0	192.53	70	37.7
2V	0.13	613.9	4.1	85.673	355	1.160	136.1	1611.5	183.06	79	49.7
3H	0.17	656.5	5.1	118.730	603	1.311	93.5	2400.2	299.94	160	58.8
4V	0.23	568.2	7.6	74.409	563	1.289	91.8	1786.2	207.23	164	64.8
5H	0.28	592.3	9.0	87.594	784	1.233	67.7	1633.2	159.19	149	23.8
6V	0.34	587.8	11.0	68.825	756	1.218	72.2	1352.8	141.60	163	47.9
7H	0.42	606.5	13.1	55.247	724	1.232	53.5	1513.5	132.86	182	31.5
8V	0.50	600.1	15.8	43.393	687	1.195	59.9	1161.5	108.96	181	32.9
9H	0.59	612.4	18.5	37.442	694	1.195	47.6	1162.7	88.69	172	31.0
10V	0.69	601.9	22.0	27.471	605	1.167	58.1	916.5	74.62	172	35.6

TOTAL ROLLING POWER : 1493 kW

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DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 28/03/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-338

SECTION ROLLED : Round 3" 1/16
Hot rolling
MATERIAL : High carbon
ROLLING SPEED : 0.67 m/s
AXV : 3272.11 mm²m/s
BILLET SIZE : 182.3 mm SQUARE
BILLET WEIGHT : 2970.0 kg
MAX HEATING CAPABILITY : 80.0 t/h
ROLLING TIME : 118.7 s
INTER BILLET : 15.0 s
PRODUCTION : 80.0 t/h

STAND NO.	ROLL DIA	GAP	GROOVE TYPE	STOCK HEIGHT	STOCK WIDTH	AREA	REDUC TION
	(mm)	(mm)		(mm)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	25.00	BOX	149.00 X	193.64	28502.0	14.0
2V	750.0	18.00	BOX	158.00 X	159.39	24563.0	13.8
3H	750.0	11.80	R.BOX	121.80 X	177.92	18738.4	23.7
4V	660.0	15.00	ROUND	136.00 X	136.12	14532.2	22.4
5H	660.0	10.90	R.OVAL	99.50 X	149.91	11783.6	18.9
6V	660.0	15.00	ROUND	111.00 X	111.00	9676.8	17.9
7H	660.0	15.00	R.OVAL	86.70 X	120.17	8301.3	14.2
8V	660.0	12.00	ROUND	95.00 X	95.01	7088.6	14.6
9H	660.0	7.54	R.OVAL	70.54 X	106.26	5808.7	18.1
10V	660.0	2.78	ROUND	79.10 X	79.10	4914.1	15.4

STAND NO.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	R O L L I N G TORQUE	R O L L I N G POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.11	627.8	3.5	118.730	415	1.163	122.2	1728.0	192.53	70	37.7
2V	0.13	613.9	4.1	85.673	355	1.160	136.1	1611.5	183.06	79	49.7
3H	0.17	656.5	5.1	118.730	603	1.311	93.5	2400.2	299.94	160	58.8
4V	0.23	568.2	7.6	74.409	563	1.289	91.8	1786.2	207.23	164	64.8
5H	0.28	592.3	9.0	87.594	784	1.233	67.7	1633.2	159.19	149	23.8
6V	0.34	587.8	11.0	68.825	756	1.218	72.2	1352.8	141.60	163	47.9
7H	0.39	605.9	12.4	55.247	686	1.166	54.1	1237.2	101.01	131	23.9
8V	0.46	597.4	14.8	43.393	640	1.171	62.6	1131.2	99.21	153	29.9
9H	0.56	612.9	17.6	37.442	657	1.220	47.1	1336.2	107.41	197	37.6
10V	0.67	600.7	21.2	27.471	582	1.182	59.3	999.1	85.78	190	40.9

TOTAL ROLLING POWER : 1458 kW

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DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 28/03/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-338

SECTION ROLLED : Round 3" 1/8
Hot rolling
MATERIAL : High carbon
ROLLING SPEED : 0.64 m/s
AXV : 3272.11 mm²m/s
BILLET SIZE : 182.3 mm SQUARE
BILLET WEIGHT : 2970.0 kg
MAX HEATING CAPABILITY : 80.0 t/h
ROLLING TIME : 118.7 s
INTER BILLET : 15.0 s
PRODUCTION : 80.0 t/h

STAND NO.	ROLL DIA	GAP	GROOVE TYPE	STOCK HEIGHT	STOCK WIDTH	AREA	REDUC TION
	(mm)	(mm)		(mm)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	25.00	BOX	149.00 X	193.64	28502.0	14.0
2V	750.0	18.00	BOX	158.00 X	159.39	24563.0	13.8
3H	750.0	11.80	R.BOX	121.80 X	177.92	18738.4	23.7
4V	660.0	15.00	ROUND	136.00 X	136.12	14532.2	22.4
5H	660.0	10.90	R.OVAL	99.50 X	149.91	11783.6	18.9
6V	660.0	18.00	ROUND	114.00 X	109.61	9936.0	15.7
7H	660.0	16.20	R.OVAL	87.90 X	122.79	8545.7	14.0
8V	660.0	14.50	ROUND	97.50 X	95.85	7344.8	14.1
9H	660.0	9.20	R.OVAL	72.20 X	108.44	6033.3	17.9
10V	660.0	2.78	ROUND	80.71 X	80.71	5116.2	15.2

STAND NO.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	ROLLING LOAD	ROLLING TORQUE	ROLLING POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.11	627.8	3.5	118.730	415	1.163	122.2	1728.0	192.53	70	37.7
2V	0.13	613.9	4.1	85.673	355	1.160	136.1	1611.5	183.06	79	49.7
3H	0.17	656.5	5.1	118.730	603	1.311	93.5	2400.2	299.94	160	58.8
4V	0.23	568.2	7.6	74.409	563	1.289	91.8	1786.2	207.23	164	64.8
5H	0.28	592.3	9.0	87.594	784	1.233	67.7	1633.2	159.19	149	23.8
6V	0.33	587.4	10.7	68.825	737	1.186	72.6	1254.5	127.45	143	43.1
7H	0.38	606.6	12.1	55.247	666	1.163	53.4	1252.8	100.05	126	23.7
8V	0.45	597.9	14.2	43.393	618	1.164	62.1	1121.1	97.94	146	29.5
9H	0.54	613.6	16.9	37.442	632	1.217	46.4	1352.6	107.83	191	37.7
10V	0.64	599.4	20.4	27.471	560	1.179	60.6	1016.1	87.42	187	41.7

TOTAL ROLLING POWER : 1415 kW

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DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 28/03/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-338

SECTION ROLLED : Round 3" 3/16
Hot rolling
MATERIAL : High carbon
ROLLING SPEED : 0.61 m/s
AXV : 3272.11 mm²m/s
BILLET SIZE : 182.3 mm SQUARE
BILLET WEIGHT : 2970.0 kg
MAX HEATING CAPABILITY : 80.0 t/h
ROLLING TIME : 118.7 s
INTER BILLET : 15.0 s
PRODUCTION : 80.0 t/h

STAND NO.	ROLL DIA	GAP	GROOVE TYPE	STOCK HEIGHT	STOCK WIDTH	AREA	REDUCTION
	(mm)	(mm)		(mm)	(mm)	(mm²)	(%)
			SQUARE	182.30	X 182.30	33147.4	
1H	750.0	25.00	BOX	149.00	X 193.64	28502.0	14.0
2V	750.0	18.00	BOX	158.00	X 159.39	24563.0	13.8
3H	750.0	11.80	R.BOX	121.80	X 177.92	18738.4	23.7
4V	660.0	15.00	ROUND	136.00	X 136.12	14532.2	22.4
5H	660.0	10.90	R.OVAL	99.50	X 149.91	11783.6	18.9
6V	660.0	20.00	ROUND	116.00	X 108.72	10098.7	14.3
7H	660.0	16.90	R.OVAL	88.60	X 124.55	8696.2	13.9
8V	660.0	16.00	ROUND	99.00	X 96.36	7500.4	13.8
9H	660.0	11.10	R.OVAL	74.10	X 109.07	6247.5	16.7
10V	660.0	2.78	ROUND	82.32	X 82.32	5322.3	14.8

STAND NO.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	ROLLING LOAD	ROLLING TORQUE	ROLLING POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.11	627.8	3.5	118.730	415	1.163	122.2	1728.0	192.53	70	37.7
2V	0.13	613.9	4.1	85.673	355	1.160	136.1	1611.5	183.06	79	49.7
3H	0.17	656.5	5.1	118.730	603	1.311	93.5	2400.2	299.94	160	58.8
4V	0.23	568.2	7.6	74.409	563	1.289	91.8	1786.2	207.23	164	64.8
5H	0.28	592.3	9.0	87.594	784	1.233	67.7	1633.2	159.19	149	23.8
6V	0.32	587.1	10.5	68.825	725	1.167	72.9	1191.4	118.48	131	40.1
7H	0.38	607.1	11.8	55.247	654	1.161	52.9	1264.5	99.50	123	23.6
8V	0.44	598.2	13.9	43.393	604	1.159	61.8	1116.2	97.42	142	29.4
9H	0.52	613.8	16.3	37.442	610	1.201	46.2	1298.2	101.36	173	35.4
10V	0.61	598.1	19.6	27.471	539	1.174	61.9	1023.0	87.03	179	41.5

TOTAL ROLLING POWER : 1371 kW

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DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 28/03/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-338

SECTION ROLLED : Round 3" 1/4
Hot rolling
MATERIAL : High carbon
ROLLING SPEED : 0.59 m/s
AXV : 3272.11 mm²m/s
BILLET SIZE : 182.3 mm SQUARE
BILLET WEIGHT : 2970.0 kg
MAX HEATING CAPABILITY : 80.0 t/h
ROLLING TIME : 118.7 s
INTER BILLET : 15.0 s
PRODUCTION : 80.0 t/h

STAND NO.	ROLL DIA	GAP	GROOVE TYPE	STOCK HEIGHT	STOCK WIDTH	AREA	REDUC TION
	(mm)	(mm)		(mm)	(mm)	(mm²)	(%)
			SQUARE	182.30	X 182.30	33147.4	
1H	750.0	25.00	BOX	149.00	X 193.64	28502.0	14.0
2V	750.0	18.00	BOX	158.00	X 159.39	24563.0	13.8
3H	750.0	11.80	R.BOX	121.80	X 177.92	18738.4	23.7
4V	660.0	15.00	ROUND	136.00	X 136.12	14532.2	22.4
5H	660.0	10.90	R.OVAL	99.50	X 149.91	11783.6	18.9
6V	660.0	20.00	ROUND	116.00	X 108.72	10098.7	14.3
7H	660.0	17.00	R.OVAL	88.70	X 124.48	8705.4	13.8
8V	660.0	16.00	ROUND	99.00	X 96.47	7504.3	13.8
9H	660.0	8.50	R.OVAL	76.90	X 107.50	6374.1	15.1
10V	660.0	3.18	ROUND	83.92	X 83.92	5531.2	13.2

STAND NO.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	ROLLING LOAD	ROLLING TORQUE	ROLLING POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.11	627.8	3.5	118.730	415	1.163	122.2	1728.0	192.53	70	37.7
2V	0.13	613.9	4.1	85.673	355	1.160	136.1	1611.5	183.06	79	49.7
3H	0.17	656.5	5.1	118.730	603	1.311	93.5	2400.2	299.94	160	58.8
4V	0.23	568.2	7.6	74.409	563	1.289	91.8	1786.2	207.23	164	64.8
5H	0.28	592.3	9.0	87.594	784	1.233	67.7	1633.2	159.19	149	23.8
6V	0.32	587.1	10.5	68.825	725	1.167	72.9	1191.4	118.48	131	40.1
7H	0.38	607.1	11.8	55.247	653	1.160	52.9	1258.9	98.87	122	23.4
8V	0.44	598.2	13.9	43.393	604	1.160	61.8	1119.0	97.62	142	29.4
9H	0.51	609.2	16.1	37.442	603	1.177	50.8	1177.6	87.35	147	30.5
10V	0.59	597.3	18.9	27.471	520	1.152	62.7	960.7	76.96	152	36.7

TOTAL ROLLING POWER : 1318 kW

*** Subject to the confidentiality clause *** M

TERMINATED AT 17:50:15

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 28/03/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-338

SECTION ROLLED : Round 3" 5/16
Hot rolling
MATERIAL : High carbon
ROLLING SPEED : 0.57 m/s
AXV : 3272.11 mm²m/s
BILLET SIZE : 182.3 mm SQUARE
BILLET WEIGHT : 2970.0 kg
MAX HEATING CAPABILITY : 80.0 t/h
ROLLING TIME : 118.7 s
INTER BILLET : 15.0 s
PRODUCTION : 80.0 t/h

STAND NO.	ROLL DIA	GAP	GROOVE TYPE	STOCK HEIGHT	STOCK WIDTH	AREA	REDUC TION
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	25.00	BOX	149.00 X	193.64	28502.0	14.0
2V	750.0	18.00	BOX	158.00 X	159.39	24563.0	13.8
3H	750.0	11.80	R.BOX	121.80 X	177.92	18738.4	23.7
4V	660.0	15.00	ROUND	136.00 X	136.12	14532.2	22.4
5H	660.0	10.90	R.OVAL	99.50 X	149.91	11783.6	18.9
6V	660.0	20.00	ROUND	116.00 X	108.72	10098.7	14.3
7H	660.0	17.40	R.OVAL	89.10 X	124.22	8742.1	13.4
8V	660.0	17.00	ROUND	100.00 X	96.42	7594.9	13.1
9H	660.0	10.50	R.OVAL	78.90 X	107.34	6576.9	13.4
10V	660.0	3.18	ROUND	85.53 X	85.53	5745.5	12.6

STAND NO.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	R O L L I N G TORQUE	R O L L I N G POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.11	627.8	3.5	118.730	415	1.163	122.2	1728.0	192.53	70	37.7
2V	0.13	613.9	4.1	85.673	355	1.160	136.1	1611.5	183.06	79	49.7
3H	0.17	656.5	5.1	118.730	603	1.311	93.5	2400.2	299.94	160	58.8
4V	0.23	568.2	7.6	74.409	563	1.289	91.8	1786.2	207.23	164	64.8
5H	0.28	592.3	9.0	87.594	784	1.233	67.7	1633.2	159.19	149	23.8
6V	0.32	587.1	10.5	68.825	725	1.167	72.9	1191.4	118.48	131	40.1
7H	0.37	607.0	11.8	55.247	651	1.155	53.0	1236.7	96.37	119	22.8
8V	0.43	598.2	13.8	43.393	597	1.151	61.8	1089.0	93.36	134	28.2
9H	0.50	609.2	15.6	37.442	584	1.155	50.8	1095.5	78.20	128	27.3
10V	0.57	596.0	18.2	27.471	501	1.145	64.0	956.0	74.89	143	35.7

TOTAL ROLLING POWER : 1278 kW

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TERMINATED AT 17:50:15

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 28/03/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-338

SECTION ROLLED : Round 3" 3/8
Hot rolling
MATERIAL : High carbon
ROLLING SPEED : 0.55 m/s
AXV : 3272.11 mm²m/s
BILLET SIZE : 182.3 mm SQUARE
BILLET WEIGHT : 2970.0 kg
MAX HEATING CAPABILITY : 80.0 t/h
ROLLING TIME : 118.7 s
INTER BILLET : 15.0 s
PRODUCTION : 80.0 t/h

STAND NO.	ROLL DIA	GAP	GROOVE TYPE	STOCK HEIGHT	STOCK WIDTH	AREA	REDUC TION
	(mm)	(mm)		(mm)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	25.00	BOX	149.00 X	193.64	28502.0	14.0
2V	750.0	18.00	BOX	158.00 X	159.39	24563.0	13.8
3H	750.0	11.80	R.BOX	121.80 X	177.92	18738.4	23.7
4V	660.0	20.00	ROUND	141.00 X	133.91	15105.8	19.4
5H	660.0	18.00	R.OVAL	106.60 X	151.34	12858.2	14.9
6V	660.0	25.00	ROUND	121.00 X	115.52	10941.0	14.9
7H	660.0	26.00	R.OVAL	97.70 X	126.63	9843.5	10.0
8V	660.0	12.00	ROUND	105.00 X	104.39	8637.8	12.2
9H	660.0	6.00	R.OVAL	79.00 X	116.67	6986.9	19.1
10V	660.0	3.18	ROUND	87.14 X	87.14	5963.8	14.6

STAND NO.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	R O L L I N G TORQUE	R O L L I N G POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.11	627.8	3.5	118.730	415	1.163	122.2	1728.0	192.53	70	37.7
2V	0.13	613.9	4.1	85.673	355	1.160	136.1	1611.5	183.06	79	49.7
3H	0.17	656.5	5.1	118.730	603	1.311	93.5	2400.2	299.94	160	58.8
4V	0.22	567.2	7.3	74.409	543	1.240	92.8	1642.0	183.87	140	57.5
5H	0.25	593.0	8.2	87.594	718	1.175	67.0	1438.9	129.53	111	19.4
6V	0.30	590.3	9.7	68.825	666	1.175	69.7	1276.9	123.42	125	41.7
7H	0.33	608.3	10.4	55.247	577	1.111	51.7	1064.0	77.01	84	18.2
8V	0.38	589.3	12.3	43.393	533	1.140	70.7	1147.6	94.75	122	28.6
9H	0.47	606.1	14.8	37.442	553	1.236	53.9	1553.7	129.36	200	45.2
10V	0.55	594.7	17.6	27.471	484	1.172	65.3	1089.0	94.15	174	44.9

TOTAL ROLLING POWER : 1266 kW

*** Subject to the confidentiality clause *** M

TERMINATED AT 17:50:15

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 28/03/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-338

SECTION ROLLED : Round 3" 7/16
Hot rolling
MATERIAL : High carbon
ROLLING SPEED : 0.53 m/s
AXV : 3272.11 mm²m/s
BILLET SIZE : 182.3 mm SQUARE
BILLET WEIGHT : 2970.0 kg
MAX HEATING CAPABILITY : 80.0 t/h
ROLLING TIME : 118.7 s
INTER BILLET : 15.0 s
PRODUCTION : 80.0 t/h

STAND NO.	ROLL DIA	GAP	GROOVE TYPE	STOCK HEIGHT	STOCK WIDTH	AREA	REDUC TION
	(mm)	(mm)		(mm)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	25.00	BOX	149.00 X	193.64	28502.0	14.0
2V	750.0	18.00	BOX	158.00 X	159.39	24563.0	13.8
3H	750.0	11.80	R.BOX	121.80 X	177.92	18738.4	23.7
4V	660.0	20.00	ROUND	141.00 X	133.91	15105.8	19.4
5H	660.0	18.00	R.OVAL	106.60 X	151.34	12858.2	14.9
6V	660.0	26.00	ROUND	122.00 X	115.06	11032.5	14.2
7H	660.0	27.00	R.OVAL	98.70 X	127.17	9986.7	9.5
8V	660.0	12.00	ROUND	105.00 X	105.76	8686.1	13.0
9H	660.0	8.10	R.OVAL	81.10 X	115.41	7195.1	17.2
10V	660.0	3.18	ROUND	88.75 X	88.75	6186.2	14.0

STAND NO.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	R O L L I N G TORQUE	R O L L I N G POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.11	627.8	3.5	118.730	415	1.163	122.2	1728.0	192.53	70	37.7
2V	0.13	613.9	4.1	85.673	355	1.160	136.1	1611.5	183.06	79	49.7
3H	0.17	656.5	5.1	118.730	603	1.311	93.5	2400.2	299.94	160	58.8
4V	0.22	567.2	7.3	74.409	543	1.240	92.8	1642.0	183.87	140	57.5
5H	0.25	593.0	8.2	87.594	718	1.175	67.0	1438.9	129.53	111	19.4
6V	0.30	590.1	9.6	68.825	661	1.165	69.9	1240.8	118.42	119	40.0
7H	0.33	608.5	10.3	55.247	568	1.105	51.5	1032.2	72.85	78	17.3
8V	0.38	589.9	12.2	43.393	529	1.150	70.1	1198.3	100.04	128	30.2
9H	0.45	605.8	14.3	37.442	537	1.207	54.2	1427.9	116.23	175	40.6
10V	0.53	593.5	17.0	27.471	468	1.163	66.5	1084.0	91.44	163	43.6

TOTAL ROLLING POWER : 1224 kW

*** Subject to the confidentiality clause *** M

TERMINATED AT 17:50:15

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 28/03/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-338

SECTION ROLLED : Round 3" 1/2
Hot rolling
MATERIAL : High carbon
ROLLING SPEED : 0.51 m/s
AXV : 3272.11 mm²m/s
BILLET SIZE : 182.3 mm SQUARE
BILLET WEIGHT : 2970.0 kg
MAX HEATING CAPABILITY : 80.0 t/h
ROLLING TIME : 118.7 s
INTER BILLET : 15.0 s
PRODUCTION : 80.0 t/h

STAND NO.	ROLL DIA	GAP	GROOVE TYPE	STOCK HEIGHT	STOCK WIDTH	AREA	REDUCTION
	(mm)	(mm)		(mm)	(mm)	(mm²)	(%)
			SQUARE	182.30	X 182.30	33147.4	
1H	750.0	25.00	BOX	149.00	X 193.64	28502.0	14.0
2V	750.0	18.00	BOX	158.00	X 159.39	24563.0	13.8
3H	750.0	11.80	R.BOX	121.80	X 177.92	18738.4	23.7
4V	660.0	20.00	ROUND	141.00	X 133.91	15105.8	19.4
5H	660.0	18.00	R.OVAL	106.60	X 151.34	12858.2	14.9
6V	660.0	28.00	ROUND	124.00	X 114.17	11212.1	12.8
7H	660.0	28.00	R.OVAL	99.70	X 128.82	10184.6	9.2
8V	660.0	13.00	ROUND	106.00	X 106.90	8826.9	13.3
9H	660.0	10.00	R.OVAL	83.00	X 115.60	7411.5	16.0
10V	660.0	3.57	ROUND	90.36	X 90.36	6412.7	13.5

STAND NO.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	ROLLING LOAD	ROLLING TORQUE	ROLLING POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.11	627.8	3.5	118.730	415	1.163	122.2	1728.0	192.53	70	37.7
2V	0.13	613.9	4.1	85.673	355	1.160	136.1	1611.5	183.06	79	49.7
3H	0.17	656.5	5.1	118.730	603	1.311	93.5	2400.2	299.94	160	58.8
4V	0.22	567.2	7.3	74.409	543	1.240	92.8	1642.0	183.87	140	57.5
5H	0.25	593.0	8.2	87.594	718	1.175	67.0	1438.9	129.53	111	19.4
6V	0.29	589.8	9.5	68.825	650	1.147	70.2	1169.1	108.63	108	36.7
7H	0.32	608.9	10.1	55.247	557	1.101	51.1	1024.2	70.33	74	16.7
8V	0.37	590.4	12.0	43.393	520	1.154	69.6	1227.6	103.26	130	31.1
9H	0.44	605.9	13.9	37.442	521	1.191	54.1	1372.7	109.80	160	38.4
10V	0.51	592.6	16.4	27.471	452	1.156	67.4	1083.2	89.91	155	42.8

TOTAL ROLLING POWER : 1187 kW

*** Subject to the confidentiality clause *** M

TERMINATED AT 17:50:15

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 28/03/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-338

SECTION ROLLED : Round 3" 9/16
Hot rolling
MATERIAL : High carbon
ROLLING SPEED : 0.50 m/s
AXV : 3328.86 mm²m/s
BILLET SIZE : 182.3 mm SQUARE
BILLET WEIGHT : 2970.0 kg
MAX HEATING CAPABILITY : 80.0 t/h
ROLLING TIME : 116.6 s
INTER BILLET : 17.0 s
PRODUCTION : 80.0 t/h

STAND NO.	ROLL DIA	GAP	GROOVE TYPE	STOCK HEIGHT	STOCK WIDTH	AREA	REDUCTION
	(mm)	(mm)		(mm)	(mm)	(mm²)	(%)
			SQUARE	182.30	X 182.30	33147.4	
1H	750.0	25.00	BOX	149.00	X 193.64	28502.0	14.0
2V	750.0	18.00	BOX	158.00	X 159.39	24563.0	13.8
3H	750.0	11.80	R.BOX	121.80	X 177.92	18738.4	23.7
4V	660.0	15.00	ROUND	136.00	X 136.12	14532.2	22.4
5H	660.0	10.90	R.OVAL	99.50	X 149.91	11783.6	18.9
6V	660.0	15.00	ROUND	111.00	X 111.00	9676.8	17.9
7H	660.0	6.20	R.OVAL	83.80	X 123.05	7796.6	19.4
8V	660.0	3.57	ROUND	92.07	X 92.07	6657.7	14.6

STAND NO.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	ROLLING LOAD	ROLLING TORQUE	ROLLING POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.12	627.8	3.6	118.730	422	1.163	122.2	1728.7	192.62	72	37.8
2V	0.14	613.9	4.2	85.673	361	1.160	136.1	1610.0	182.89	81	49.7
3H	0.18	656.5	5.2	118.730	614	1.311	93.5	2395.5	299.36	162	58.7
4V	0.23	568.2	7.7	74.409	573	1.289	91.8	1781.2	206.66	167	64.6
5H	0.28	592.3	9.1	87.594	798	1.233	67.7	1627.7	158.65	151	23.7
6V	0.34	587.8	11.2	68.825	769	1.218	72.2	1347.5	141.04	165	47.7
7H	0.43	602.8	13.5	55.247	747	1.241	57.2	1500.9	128.68	182	30.5
8V	0.50	591.3	16.2	43.393	701	1.171	68.7	1054.2	92.80	157	28.0

TOTAL ROLLING POWER : 1137 kW

*** Subject to the confidentiality clause *** M

TERMINATED AT 17:50:15

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 28/03/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-338

SECTION ROLLED : Round 3" 5/8
Hot rolling
MATERIAL : High carbon
ROLLING SPEED : 0.50 m/s
AXV : 3445.57 mm²m/s
BILLET SIZE : 182.3 mm SQUARE
BILLET WEIGHT : 2970.0 kg
MAX HEATING CAPABILITY : 80.0 t/h
ROLLING TIME : 112.7 s
INTER BILLET : 21.0 s
PRODUCTION : 80.0 t/h

STAND NO.	ROLL DIA	GAP	GROOVE TYPE	STOCK HEIGHT	STOCK WIDTH	AREA	REDUCTION
	(mm)	(mm)		(mm)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	25.00	BOX	149.00 X	193.64	28502.0	14.0
2V	750.0	18.00	BOX	158.00 X	159.39	24563.0	13.8
3H	750.0	11.80	R.BOX	121.80 X	177.92	18738.4	23.7
4V	660.0	15.00	ROUND	136.00 X	136.12	14532.2	22.4
5H	660.0	10.90	R.OVAL	99.50 X	149.91	11783.6	18.9
6V	660.0	15.00	ROUND	111.00 X	111.00	9676.8	17.9
7H	660.0	8.30	R.OVAL	85.90 X	121.54	8012.5	17.2
8V	660.0	3.57	ROUND	93.67 X	93.67	6891.1	14.0

STAND NO.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	ROLLING LOAD	ROLLING TORQUE	ROLLING POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.12	627.8	3.7	118.730	437	1.163	122.2	1730.5	192.81	74	37.8
2V	0.14	613.9	4.4	85.673	374	1.160	136.1	1607.3	182.58	83	49.6
3H	0.18	656.5	5.3	118.730	635	1.311	93.5	2386.6	298.24	167	58.5
4V	0.24	568.2	8.0	74.409	593	1.289	91.8	1771.7	205.55	172	64.3
5H	0.29	592.3	9.4	87.594	826	1.233	67.7	1617.1	157.61	156	23.6
6V	0.36	587.8	11.6	68.825	796	1.218	72.2	1337.2	139.97	170	47.3
7H	0.43	602.4	13.6	55.247	753	1.208	57.6	1354.6	112.47	161	26.6
8V	0.50	590.0	16.2	43.393	702	1.163	70.0	1037.1	89.10	151	26.9

TOTAL ROLLING POWER : 1133 kW

*** Subject to the confidentiality clause *** M

TERMINATED AT 17:50:15

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 28/03/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-338

SECTION ROLLED : Round 3" 3/4
Hot rolling
MATERIAL : High carbon
ROLLING SPEED : 0.50 m/s
AXV : 3686.53 mm²m/s
BILLET SIZE : 182.3 mm SQUARE
BILLET WEIGHT : 2970.0 kg
MAX HEATING CAPABILITY : 80.0 t/h
ROLLING TIME : 105.3 s
INTER BILLET : 28.3 s
PRODUCTION : 80.0 t/h

STAND NO.	ROLL DIA	GAP	GROOVE TYPE	STOCK HEIGHT	STOCK WIDTH	AREA	REDUCTION
	(mm)	(mm)		(mm)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	25.00	BOX	149.00 X	193.64	28502.0	14.0
2V	750.0	18.00	BOX	158.00 X	159.39	24563.0	13.8
3H	750.0	11.80	R.BOX	121.80 X	177.92	18738.4	23.7
4V	660.0	15.00	ROUND	136.00 X	136.12	14532.2	22.4
5H	660.0	15.00	R.OVAL	103.60 X	147.35	12233.4	15.8
6V	660.0	24.00	ROUND	120.00 X	111.41	10650.3	12.9
7H	660.0	6.40	R.OVAL	87.30 X	131.00	8793.5	17.4
8V	660.0	3.57	ROUND	96.89 X	96.89	7373.1	16.2

STAND NO.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	ROLLING LOAD	ROLLING TORQUE	ROLLING POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.13	627.8	3.9	118.730	467	1.163	122.2	1734.4	193.25	80	37.9
2V	0.15	613.9	4.7	85.673	400	1.160	136.1	1602.8	182.07	89	49.5
3H	0.20	656.5	5.7	118.730	680	1.311	93.5	2370.6	296.24	178	58.1
4V	0.25	568.2	8.5	74.409	634	1.289	91.8	1754.3	203.54	182	63.7
5H	0.30	592.0	9.7	87.594	852	1.188	68.0	1416.1	131.85	134	19.7
6V	0.35	588.4	11.2	68.825	773	1.149	71.6	1118.7	104.34	123	35.3
7H	0.42	599.3	13.4	55.247	738	1.211	60.7	1469.7	122.95	172	29.1
8V	0.50	587.5	16.3	43.393	705	1.193	72.5	1189.0	112.23	191	33.9

TOTAL ROLLING POWER : 1148 kW

*** Subject to the confidentiality clause *** M

TERMINATED AT 17:50:15

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 28/03/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-338

SECTION ROLLED : Round 3" 7/8
Hot rolling
MATERIAL : High carbon
ROLLING SPEED : 0.50 m/s
AXV : 3935.63 mm²m/s
BILLET SIZE : 182.3 mm SQUARE
BILLET WEIGHT : 2970.0 kg
MAX HEATING CAPABILITY : 80.0 t/h
ROLLING TIME : 98.6 s
INTER BILLET : 35.0 s
PRODUCTION : 80.0 t/h

STAND NO.	ROLL DIA	GAP	GROOVE TYPE	STOCK HEIGHT	STOCK WIDTH	AREA	REDUCTION
	(mm)	(mm)		(mm)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	25.00	BOX	149.00 X	193.64	28502.0	14.0
2V	750.0	18.00	BOX	158.00 X	159.39	24563.0	13.8
3H	750.0	11.80	R.BOX	121.80 X	177.92	18738.4	23.7
4V	660.0	15.00	ROUND	136.00 X	136.12	14532.2	22.4
5H	660.0	16.00	R.OVAL	104.60 X	146.76	12337.5	15.1
6V	660.0	24.00	ROUND	120.00 X	112.49	10700.9	13.3
7H	660.0	10.70	R.OVAL	91.60 X	128.29	9236.9	13.7
8V	660.0	3.57	ROUND	100.11 X	100.11	7871.3	14.8

STAND NO.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	ROLLING LOAD	ROLLING TORQUE	ROLLING POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.14	627.8	4.2	118.730	499	1.163	122.2	1739.0	193.76	85	38.0
2V	0.16	613.9	5.0	85.673	427	1.160	136.1	1599.4	181.68	95	49.3
3H	0.21	656.5	6.1	118.730	725	1.311	93.5	2357.0	294.54	188	57.7
4V	0.27	568.2	9.1	74.409	677	1.289	91.8	1739.2	201.78	192	63.1
5H	0.32	591.9	10.3	87.594	902	1.178	68.1	1358.7	124.98	135	18.7
6V	0.37	588.9	11.9	68.825	821	1.153	71.1	1124.2	104.41	130	35.3
7H	0.43	598.7	13.6	55.247	751	1.158	61.3	1225.6	96.11	137	22.8
8V	0.50	584.9	16.3	43.393	708	1.173	75.1	1148.8	103.10	176	31.1

TOTAL ROLLING POWER : 1139 kW

*** Subject to the confidentiality clause *** M

TERMINATED AT 17:50:15

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 28/03/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-338

SECTION ROLLED : Round 4" 1/2
Hot rolling
MATERIAL : High carbon
ROLLING SPEED : 0.50 m/s
AXV : 5301.48 mm²m/s
BILLET SIZE : 182.3 mm SQUARE
BILLET WEIGHT : 2970.0 kg
MAX HEATING CAPABILITY : 80.0 t/h
ROLLING TIME : 73.2 s
INTER BILLET : 60.4 s
PRODUCTION : 80.0 t/h

STAND NO.	ROLL DIA	GAP	GROOVE TYPE	STOCK HEIGHT	STOCK WIDTH	AREA	REDUCTION
	(mm)	(mm)		(mm)	(mm)	(mm²)	(%)
			SQUARE	182.30	X 182.30	33147.4	
1H	750.0	25.00	BOX	149.00	X 193.64	28502.0	14.0
2V	750.0	18.00	BOX	158.00	X 159.39	24563.0	13.8
3H	750.0	12.90	R.BOX	122.90	X 177.27	18911.1	23.0
4V	660.0	18.00	ROUND	139.00	X 136.12	14922.2	21.1
5H	660.0	6.80	R.OVAL	107.00	X 149.81	12480.2	16.4
6V	660.0	3.97	ROUND	116.19	X 116.19	10603.0	15.0

STAND NO.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	ROLLING LOAD	ROLLING TORQUE	ROLLING POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.19	627.8	5.7	118.730	672	1.163	122.2	1767.4	196.92	117	38.6
2V	0.22	613.9	6.7	85.673	575	1.160	136.1	1594.7	181.15	127	49.2
3H	0.28	656.2	8.2	118.730	969	1.299	93.8	2267.1	281.05	240	55.1
4V	0.36	568.4	11.9	74.409	888	1.267	91.6	1634.8	186.14	233	58.2
5H	0.42	583.5	13.9	87.594	1218	1.196	76.5	1371.5	123.46	180	22.5
6V	0.50	572.7	16.7	68.825	1148	1.177	87.3	1149.0	109.93	192	42.7

TOTAL ROLLING POWER : 1089 kW

*** Subject to the confidentiality clause *** M

TERMINATED AT 17:50:15

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 28/03/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-338

SECTION ROLLED : Round 4" 3/4
Hot rolling
MATERIAL : High carbon
ROLLING SPEED : 0.50 m/s
AXV : 5914.13 mm²m/s
BILLET SIZE : 182.3 mm SQUARE
BILLET WEIGHT : 2970.0 kg
MAX HEATING CAPABILITY : 80.0 t/h
ROLLING TIME : 65.6 s
INTER BILLET : 68.0 s
PRODUCTION : 80.0 t/h

STAND NO.	ROLL DIA	GAP	GROOVE TYPE	STOCK HEIGHT	STOCK WIDTH	AREA	REDUCTION
	(mm)	(mm)		(mm)	(mm)	(mm²)	(%)
			SQUARE	182.30 X 182.30		33147.4	
1H	750.0	25.00	BOX	149.00 X 193.64		28502.0	14.0
2V	750.0	18.00	BOX	158.00 X 159.39		24563.0	13.8
3H	750.0	15.10	R.BOX	125.10 X 175.99		19247.7	21.6
4V	660.0	24.00	ROUND	145.00 X 136.14		15702.9	18.4
5H	660.0	14.50	R.OVAL	114.70 X 152.66		13715.4	12.7
6V	660.0	3.97	ROUND	122.72 X 122.72		11828.3	13.8

STAND NO.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	ROLLING LOAD	ROLLING TORQUE	ROLLING POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.21	627.8	6.3	118.730	749	1.163	122.2	1780.7	198.41	131	38.9
2V	0.24	613.9	7.5	85.673	642	1.160	136.1	1596.9	181.41	142	49.3
3H	0.31	655.7	8.9	118.730	1063	1.276	94.3	2167.1	264.14	248	55.0
4V	0.38	568.7	12.6	74.409	941	1.226	91.3	1512.9	164.89	218	51.6
5H	0.43	584.7	14.1	87.594	1234	1.145	75.3	1196.6	98.11	145	18.1
6V	0.50	567.6	16.8	68.825	1158	1.160	92.4	1144.3	105.31	186	41.2

TOTAL ROLLING POWER : 1070 kW

*** Subject to the confidentiality clause *** M

TERMINATED AT 17:50:15

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 28/03/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-338

SECTION ROLLED : Round 4"
Hot rolling
MATERIAL : High carbon
ROLLING SPEED : 0.50 m/s
AXV : 4192.07 mm²m/s
BILLET SIZE : 182.3 mm SQUARE
BILLET WEIGHT : 2970.0 kg
MAX HEATING CAPABILITY : 80.0 t/h
ROLLING TIME : 92.6 s
INTER BILLET : 41.0 s
PRODUCTION : 80.0 t/h

STAND NO.	ROLL DIA	GAP	GROOVE TYPE	STOCK HEIGHT	STOCK WIDTH	AREA	REDUC TION
	(mm)	(mm)		(mm)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	25.00	BOX	149.00 X	193.64	28502.0	14.0
2V	750.0	18.00	BOX	158.00 X	159.39	24563.0	13.8
3H	750.0	15.10	R.BOX	125.10 X	175.99	19247.7	21.6
4V	660.0	24.00	ROUND	145.00 X	136.14	15702.9	18.4
5H	660.0	14.50	R.OVAL	114.70 X	152.66	13715.4	12.7
6V	660.0	3.97	ROUND	122.72 X	122.78	11829.4	13.8
7H	660.0	7.50	R.OVAL	95.10 X	133.75	9767.0	17.4
8V	660.0	3.97	ROUND	103.32 X	103.32	8384.1	14.2

STAND NO.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	ROLLING LOAD	ROLLING TORQUE	ROLLING POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.15	627.8	4.5	118.730	531	1.163	122.2	1743.9	194.31	91	38.1
2V	0.17	613.9	5.3	85.673	455	1.160	136.1	1596.9	181.40	101	49.3
3H	0.22	655.7	6.3	118.730	753	1.276	94.3	2202.7	268.48	178	52.6
4V	0.27	568.7	9.0	74.409	667	1.226	91.3	1559.0	169.91	160	53.1
5H	0.31	584.7	10.0	87.594	875	1.145	75.3	1246.3	102.19	107	15.3
6V	0.35	567.6	11.9	68.825	821	1.159	92.4	1204.3	110.82	138	37.5
7H	0.43	594.5	13.8	55.247	762	1.211	65.5	1484.3	129.25	187	30.6
8V	0.50	582.8	16.4	43.393	711	1.165	77.2	1138.1	101.89	175	30.7

TOTAL ROLLING POWER : 1136 kW

*** Subject to the confidentiality clause *** M

TERMINATED AT 17:50:15

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 28/03/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-338

SECTION ROLLED : Round 4" 1/4
Hot rolling
MATERIAL : High carbon
ROLLING SPEED : 0.50 m/s
AXV : 4730.95 mm²m/s
BILLET SIZE : 182.3 mm SQUARE
BILLET WEIGHT : 2970.0 kg
MAX HEATING CAPABILITY : 80.0 t/h
ROLLING TIME : 82.1 s
INTER BILLET : 51.6 s
PRODUCTION : 80.0 t/h

STAND NO.	ROLL DIA	GAP	GROOVE TYPE	STOCK HEIGHT	STOCK WIDTH	AREA	REDUCTION
	(mm)	(mm)		(mm)	(mm)	(mm²)	(%)
			SQUARE	182.30 X 182.30		33147.4	
1H	750.0	25.00	BOX	149.00 X 193.64		28502.0	14.0
2V	750.0	18.00	BOX	158.00 X 159.39		24563.0	13.8
3H	750.0	15.10	R.BOX	125.10 X 175.99		19247.7	21.6
4V	660.0	24.00	ROUND	145.00 X 136.14		15702.9	18.4
5H	660.0	15.00	R.OVAL	115.20 X 152.37		13774.5	12.3
6V	660.0	8.50	ROUND	127.25 X 121.36		12319.2	10.6
7H	660.0	15.40	R.OVAL	103.00 X 134.29		10805.5	12.3
8V	660.0	3.97	ROUND	109.76 X 109.76		9461.9	12.4

STAND NO.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	ROLLING LOAD	ROLLING TORQUE	ROLLING POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.17	627.8	5.0	118.730	600	1.163	122.2	1755.1	195.55	103	38.3
2V	0.19	613.9	6.0	85.673	513	1.160	136.1	1594.5	181.13	114	49.2
3H	0.25	655.7	7.2	118.730	850	1.276	94.3	2185.9	266.44	200	52.2
4V	0.30	568.7	10.1	74.409	753	1.226	91.3	1539.3	167.76	178	52.5
5H	0.34	584.6	11.2	87.594	983	1.140	75.4	1201.8	97.63	115	14.6
6V	0.38	567.0	12.9	68.825	890	1.118	93.0	1024.6	88.24	120	29.8
7H	0.44	594.9	14.1	55.247	777	1.140	65.1	1184.7	91.36	134	21.6
8V	0.50	577.8	16.5	43.393	717	1.142	82.2	1095.6	91.96	159	27.7

TOTAL ROLLING POWER : 1122 kW

*** Subject to the confidentiality clause *** M

TERMINATED AT 17:50:15

3 Motor utilization diagrams