DANIELI MORGÅRDSHAMMAR	JOB N° DPC68X01	Doc.: 000-000-375-616 Rev: 00 Page: 1/57
	Customer: BARRAMANSA	

ROLLING MILL CALCULATIONS

FOR SPRING FLATS

Remarks:

- For rolling sequences see drawing 000-000-361-341
- Calculations consider an average temperature of 1100°C at first stand entry

Rev.	Date	Description	Compiled	Checked	Approved
00	07-04-2023	ISSUED	Trevisan M.	Paron L.	

DOCUMENT CONTENTS

Remark:

- R-factor = elongation

1 Gear ratios and motors summarizing table

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

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 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 4"x1/4"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 5.00 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 (mm)	GAP (mm)	GROOVE TYPE	STOCK HEIGHT (mm)	STOCK WIDTH (mm)	AREA (mm²)	REDUC TION (%)
			SQUARE	182.30	X 182.30	33147.4	
1H	750.0	20.00	BOX	124.00	X 206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50	X 144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30	X 162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00	X 111.05	9678.9	26.7
5H	660.0	12.00	R.OVAL	67.60	X 132.57	6963.3	28.1
6V	660.0	12.00	ROUND	82.00	X 82.39	5292.1	24.0
7H	660.0	40.00	FLAT	40.00	X 106.11	4038.9	23.7
8V	660.0	10.00	EDGING	73.00	X 45.11	3081.6	23.7
9H	660.0	24.50	FLAT	24.50	X 90.31	2151.7	30.2
10H	660.0	15.50	FLAT	15.50	X 102.05	1551.0	27.9
11H	590.0	10.60	FLAT	10.60	X 109.77	1147.4	26.0
12V	590.0	10.00	EDGING	100.00	X 10.92	1078.3	6.0
13H	590.0	7.90	FLAT	7.90	X 105.55	825.7	23.4
14V	590.0	10.00	EDGING	100.00	X 8.05	790.6	4.2
15H	590.0	6.43	FLAT	6.43	X 102.92	654.6	17.2

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DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 4"x1/4"
Hot rolling
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ROLLING SPEED : 5.00 m/s
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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.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	TORQUE	POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.47	619.5	14.5	87.594	1269	1.390	40.5	1843.3	187.70	285	35.6
6V	0.62	607.8	19.4	68.825	1337	1.316	52.2	1158.2	131.33	267	59.4
7H	0.81	660.0	23.4	55.247	1295	1.310	0.0	1554.7	161.38	396	49.5
8V	1.06	601.7	33.7	43.393	1463	1.311	58.3	615.9	59.15	209	26.1
9H	1.52	660.0	44.0	37.442	1648	1.432	0.0	1457.6	112.01	516	64.5
10H	2.11	660.0	61.0	27.471	1677	1.387	0.0	1407.4	73.40	469	58.7
11H	2.85	590.0	92.3	17.428	1609	1.352	0.0	1297.6	47.35	458	57.2
12V	3.03	501.3	115.6	13.852	1602	1.064	88.7	69.3	3.59	43	5.4
13H	3.96	590.0	128.3	11.734	1505	1.306	0.0	1208.5	34.55	464	58.0
14V	4.14	501.8	157.5	9.471	1492	1.044	88.2	42.6	1.81	30	3.7
15H	5.00	590.0	161.8	9.841	1592	1.208	0.0	918.6	19.30	327	40.9

TOTAL ROLLING POWER : 4224 kW

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DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 4"x5/16"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 4.01 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)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	20.00	BOX	124.00 X	206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50 X	144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30 X	162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00 X	111.05	9678.9	26.7
5H	660.0	12.00	R.OVAL	67.60 X	132.57	6963.3	28.1
6V	660.0	12.00	ROUND	82.00 X	82.39	5292.1	24.0
7H	660.0	40.00	FLAT	40.00 X	106.11	4038.9	23.7
8V	660.0	10.00	EDGING	73.00 X	45.11	3081.6	23.7
9H	660.0	24.50	FLAT	24.50 X	90.31	2151.7	30.2
10H	660.0	15.80	FLAT	15.80 X	101.52	1573.8	26.9
11H	590.0	11.20	FLAT	11.20 X	108.47	1198.7	23.8
12V	590.0	12.00	EDGING	102.00 X	11.40	1146.2	4.4
13H	590.0	9.00	FLAT	9.00 X	105.84	943.5	17.7
14V	590.0	10.00	EDGING	101.50 X	9.13	908.2	3.7
15H	590.0	8.04	FLAT	8.04 X	102.92	815.8	10.2

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DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 4"x5/16"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 4.01 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.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	TORQUE	POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.47	619.5	14.5	87.594	1269	1.390	40.5	1843.3	187.70	285	35.6
6V	0.62	607.8	19.4	68.825	1337	1.316	52.2	1158.2	131.33	267	59.4
7H	0.81	660.0	23.4	55.247	1295	1.310	0.0	1554.7	161.38	396	49.5
8V	1.06	601.7	33.7	43.393	1463	1.311	58.3	615.9	59.15	209	26.1
9H	1.52	660.0	44.0	37.442	1648	1.432	0.0	1457.6	112.01	516	64.5
10H	2.08	660.0	60.2	27.471	1653	1.367	0.0	1354.6	69.65	439	54.8
11H	2.73	590.0	88.4	17.428	1540	1.313	0.0	1187.6	42.27	391	48.9
12V	2.85	501.5	108.7	13.852	1506	1.046	88.5	56.0	2.42	28	3.4
13H	3.47	590.0	112.3	11.734	1317	1.215	0.0	951.7	24.63	290	36.2
14V	3.60	500.5	137.5	9.471	1302	1.039	89.5	43.8	1.73	25	3.1
15H	4.01	590.0	129.8	9.841	1278	1.113	0.0	597.3	10.62	144	18.1

TOTAL ROLLING POWER : 3749 kW

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DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 3-1/2"x3/8"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 3.84 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)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	20.00	BOX	124.00 X	206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50 X	144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30 X	162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00 X	111.05	9678.9	26.7
5H	660.0	12.00	R.OVAL	67.60 X	132.57	6963.3	28.1
6V	660.0	12.00	ROUND	82.00 X	82.39	5292.1	24.0
7H	660.0	40.00	FLAT	40.00 X	106.11	4038.9	23.7
8V	660.0	19.00	EDGING	82.00 X	43.30	3382.2	16.3
9H	660.0	24.00	FLAT	24.00 X	99.55	2329.1	31.1
10V	660.0	10.00	EDGING	84.00 X	25.50	2072.0	11.0
11H	590.0	15.00	FLAT	15.00 X	96.85	1421.3	31.4
12V	590.0	10.00	EDGING	85.00 X	15.70	1304.6	8.2
13H	590.0	10.80	FLAT	10.80 X	92.45	983.1	24.6
14V	590.0	10.00	EDGING	88.50 X	10.97	945.2	3.9
15H	590.0	9.65	FLAT	9.65 X	90.06	852.7	9.8

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DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 3-1/2"x3/8"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 3.84 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.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	TORQUE	POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.47	619.5	14.5	87.594	1269	1.390	40.5	1843.3	187.70	285	35.6
6V	0.62	607.8	19.4	68.825	1337	1.316	52.2	1158.2	131.33	267	59.4
7H	0.81	660.0	23.4	55.247	1295	1.310	0.0	1554.7	161.38	396	49.5
8V	0.97	600.9	30.7	43.393	1334	1.194	59.1	456.3	37.84	122	15.2
9H	1.40	660.0	40.7	37.442	1522	1.452	0.0	1643.3	123.95	528	66.0
10V	1.58	588.7	51.2	27.471	1407	1.124	71.3	223.7	15.49	83	10.4
11H	2.30	590.0	74.5	17.428	1299	1.458	0.0	1429.9	75.38	588	73.5
12V	2.51	516.9	92.7	13.852	1284	1.089	73.1	116.0	6.61	64	8.0
13H	3.33	590.0	107.7	11.734	1264	1.327	0.0	1116.3	40.71	459	57.4
14V	3.46	513.8	128.7	9.471	1219	1.040	76.2	49.1	1.86	25	3.1
15H	3.84	590.0	124.2	9.841	1222	1.109	0.0	487.2	9.59	125	15.6

TOTAL ROLLING POWER : 3702 kW

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DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 94x9.53
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 3.63 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)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	20.00	BOX	124.00 X	206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50 X	144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30 X	162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00 X	111.05	9678.9	26.7
5H	660.0	12.00	R.OVAL	67.60 X	132.57	6963.3	28.1
6V	660.0	12.00	ROUND	82.00 X	82.39	5292.1	24.0
7H	660.0	40.00	FLAT	40.00 X	106.11	4038.9	23.7
8V	660.0	21.00	EDGING	84.00 X	42.92	3442.1	14.8
9H	660.0	24.00	FLAT	24.00 X	101.40	2374.1	31.0
10V	660.0	13.00	EDGING	87.00 X	25.32	2135.6	10.0
11H	590.0	15.00	FLAT	15.00 X	99.76	1465.3	31.4
12V	590.0	16.00	EDGING	91.00 X	15.44	1376.7	6.0
13H	590.0	10.80	FLAT	10.80 X	98.10	1044.6	24.1
14V	590.0	15.00	EDGING	93.50 X	10.99	1001.4	4.1
15H	590.0	9.65	FLAT	9.65 X	95.22	902.4	9.9

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DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 94x9.53
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 3.63 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.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	TORQUE	POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.47	619.5	14.5	87.594	1269	1.390	40.5	1843.3	187.70	285	35.6
6V	0.62	607.8	19.4	68.825	1337	1.316	52.2	1158.2	131.33	267	59.4
7H	0.81	660.0	23.4	55.247	1295	1.310	0.0	1554.7	161.38	396	49.5
8V	0.95	600.8	30.2	43.393	1311	1.173	59.2	422.3	33.59	106	13.3
9H	1.38	660.0	39.9	37.442	1493	1.450	0.0	1669.2	124.92	522	65.2
10V	1.53	588.6	49.7	27.471	1366	1.112	71.4	210.8	14.12	74	9.2
11H	2.23	590.0	72.3	17.428	1260	1.457	0.0	1478.0	77.41	586	73.2
12V	2.38	516.8	87.8	13.852	1217	1.064	73.2	92.7	4.59	42	5.3
13H	3.13	590.0	101.4	11.734	1190	1.318	0.0	1175.2	41.83	444	55.5
14V	3.27	513.9	121.4	9.471	1150	1.043	76.1	54.0	2.18	28	3.5
15H	3.63	590.0	117.4	9.841	1155	1.110	0.0	532.8	10.55	130	16.2

TOTAL ROLLING POWER : 3639 kW

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DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 4"x3/8"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 3.35 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)	(mm)	(mm²)	(%)
			SQUARE	182.30	X 182.30	33147.4	
1H	750.0	20.00	BOX	124.00	X 206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50	X 144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30	X 162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00	X 111.05	9678.9	26.7
5H	660.0	13.00	R.OVAL	68.60	X 131.76	7070.5	26.9
6V	660.0	15.00	ROUND	85.00	X 82.27	5524.3	21.9
7H	660.0	40.00	FLAT	40.00	X 109.80	4183.1	24.3
8V	660.0	30.00	EDGING	93.00	X 41.83	3741.7	10.6
9H	660.0	24.00	FLAT	24.00	X 110.04	2583.0	31.0
10V	660.0	21.00	EDGING	95.00	X 25.24	2332.0	9.7
11H	590.0	15.00	FLAT	15.00	X 107.89	1586.7	32.0
12V	590.0	24.00	EDGING	99.00	X 15.39	1495.9	5.7
13H	590.0	10.80	FLAT	10.80	X 106.09	1130.9	24.4
14V	590.0	22.70	EDGING	101.20	X 10.98	1085.0	4.1
15H	590.0	9.65	FLAT	9.65	X 102.92	976.7	10.0

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

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 4"x3/8"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 3.35 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.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	TORQUE	POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.46	619.3	14.3	87.594	1250	1.369	40.7	1781.9	179.95	269	33.6
6V	0.59	607.8	18.6	68.825	1281	1.280	52.2	1100.9	122.04	238	52.9
7H	0.78	660.0	22.6	55.247	1251	1.321	0.0	1638.5	170.79	405	50.6
8V	0.87	600.6	27.8	43.393	1207	1.118	59.4	334.0	23.16	67	8.4
9H	1.27	660.0	36.7	37.442	1372	1.449	0.0	1814.7	132.71	509	63.7
10V	1.40	588.6	45.5	27.471	1251	1.108	71.4	215.1	14.80	71	8.8
11H	2.06	590.0	66.8	17.428	1163	1.470	0.0	1650.3	86.30	603	75.4
12V	2.19	516.8	80.8	13.852	1120	1.061	73.2	92.6	4.62	39	4.9
13H	2.89	590.0	93.7	11.734	1099	1.323	0.0	1312.3	46.52	456	57.0
14V	3.02	513.8	112.1	9.471	1062	1.042	76.2	55.7	2.32	27	3.4
15H	3.35	590.0	108.4	9.841	1067	1.111	0.0	596.0	11.76	134	16.7

TOTAL ROLLING POWER : 3579 kW

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

TERMINATED AT 10:24:52

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 100x10
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 3.25 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)	(mm)	(mm²)	(%)
			SQUARE	182.30	X 182.30	33147.4	
1H	750.0	20.00	BOX	124.00	X 206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50	X 144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30	X 162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00	X 111.05	9678.9	26.7
5H	660.0	13.00	R.OVAL	68.60	X 131.76	7070.5	26.9
6V	660.0	15.00	ROUND	85.00	X 82.27	5524.3	21.9
7H	660.0	40.00	FLAT	40.00	X 109.80	4183.1	24.3
8V	660.0	30.00	EDGING	93.00	X 41.83	3741.7	10.6
9H	660.0	24.00	FLAT	24.00	X 110.04	2583.0	31.0
10V	660.0	21.00	EDGING	95.00	X 25.24	2332.0	9.7
11H	590.0	15.00	FLAT	15.00	X 107.89	1586.7	32.0
12V	590.0	23.00	EDGING	98.00	X 15.45	1486.4	6.3
13H	590.0	11.00	FLAT	11.00	X 104.77	1137.4	23.5
14V	590.0	21.70	EDGING	100.20	X 11.17	1091.6	4.0
15H	590.0	10.13	FLAT	10.13	X 101.30	1007.0	7.8

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

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 100x10
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 3.25 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.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	TORQUE	POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.46	619.3	14.3	87.594	1250	1.369	40.7	1781.9	179.95	269	33.6
6V	0.59	607.8	18.6	68.825	1281	1.280	52.2	1100.9	122.04	238	52.9
7H	0.78	660.0	22.6	55.247	1251	1.321	0.0	1638.5	170.79	405	50.6
8V	0.87	600.6	27.8	43.393	1207	1.118	59.4	334.0	23.16	67	8.4
9H	1.27	660.0	36.7	37.442	1372	1.449	0.0	1814.7	132.71	509	63.7
10V	1.40	588.6	45.5	27.471	1251	1.108	71.4	215.1	14.80	71	8.8
11H	2.06	590.0	66.8	17.428	1163	1.470	0.0	1650.3	86.30	603	75.4
12V	2.20	516.8	81.3	13.852	1127	1.067	73.2	100.2	5.27	45	5.6
13H	2.88	590.0	93.1	11.734	1093	1.307	0.0	1250.3	43.76	427	53.3
14V	3.00	514.0	111.4	9.471	1055	1.042	76.0	55.6	2.28	27	3.3
15H	3.25	590.0	105.2	9.841	1035	1.084	0.0	468.2	8.29	91	11.4

TOTAL ROLLING POWER : 3512 kW

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

TERMINATED AT 10:24:52

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 3-1/2"x7/16"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 3.30 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)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	20.00	BOX	124.00 X	206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50 X	144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30 X	162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00 X	111.05	9678.9	26.7
5H	660.0	12.00	R.OVAL	67.60 X	132.57	6963.3	28.1
6V	660.0	12.00	ROUND	82.00 X	82.39	5292.1	24.0
7H	660.0	40.00	FLAT	40.00 X	106.11	4038.9	23.7
8V	660.0	19.00	EDGING	82.00 X	43.30	3382.2	16.3
9H	660.0	24.00	FLAT	24.00 X	99.55	2329.1	31.1
10V	660.0	10.00	EDGING	84.00 X	25.50	2072.0	11.0
11H	590.0	15.50	FLAT	15.50 X	96.02	1459.1	29.6
12V	590.0	13.50	EDGING	88.50 X	15.91	1376.0	5.7
13H	590.0	12.20	FLAT	12.20 X	93.49	1123.8	18.3
14V	590.0	10.00	EDGING	88.80 X	12.45	1070.4	4.8
15H	590.0	11.26	FLAT	11.26 X	90.06	990.3	7.5

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

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 3-1/2"x7/16"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 3.30 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.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	TORQUE	POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.47	619.5	14.5	87.594	1269	1.390	40.5	1843.3	187.70	285	35.6
6V	0.62	607.8	19.4	68.825	1337	1.316	52.2	1158.2	131.33	267	59.4
7H	0.81	660.0	23.4	55.247	1295	1.310	0.0	1554.7	161.38	396	49.5
8V	0.97	600.9	30.7	43.393	1334	1.194	59.1	456.3	37.84	122	15.2
9H	1.40	660.0	40.7	37.442	1522	1.452	0.0	1643.3	123.95	528	66.0
10V	1.58	588.7	51.2	27.471	1407	1.124	71.3	223.7	15.49	83	10.4
11H	2.24	590.0	72.6	17.428	1265	1.420	0.0	1348.6	69.65	529	66.2
12V	2.38	517.0	87.8	13.852	1217	1.060	73.0	89.4	4.19	39	4.8
13H	2.91	590.0	94.3	11.734	1106	1.224	0.0	880.9	28.46	281	35.1
14V	3.06	514.0	113.6	9.471	1076	1.050	76.0	66.6	2.80	33	4.2
15H	3.30	590.0	107.0	9.841	1053	1.081	0.0	405.1	7.66	86	10.7

TOTAL ROLLING POWER : 3409 kW

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

TERMINATED AT 10:24:52

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 4"x7/16"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 2.88 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)	(mm)	(mm²)	(%)
			SQUARE	182.30	X 182.30	33147.4	
1H	750.0	20.00	BOX	124.00	X 206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50	X 144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30	X 162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00	X 111.05	9678.9	26.7
5H	660.0	13.00	R.OVAL	68.60	X 131.76	7070.5	26.9
6V	660.0	15.00	ROUND	85.00	X 82.27	5524.3	21.9
7H	660.0	40.00	FLAT	40.00	X 109.80	4183.1	24.3
8V	660.0	30.00	EDGING	93.00	X 41.83	3741.7	10.6
9H	660.0	24.00	FLAT	24.00	X 110.04	2583.0	31.0
10V	660.0	23.00	EDGING	97.00	X 25.02	2364.2	8.5
11H	590.0	15.50	FLAT	15.50	X 108.84	1658.3	29.9
12V	590.0	26.00	EDGING	101.00	X 15.85	1569.9	5.3
13H	590.0	12.20	FLAT	12.20	X 106.00	1276.3	18.7
14V	590.0	23.00	EDGING	101.80	X 12.38	1226.0	3.9
15H	590.0	11.26	FLAT	11.26	X 102.92	1135.1	7.4

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

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 4"x7/16"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 2.88 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.	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	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.46	619.3	14.3	87.594	1250	1.369	40.7	1781.9	179.95	269	33.6
6V	0.59	607.8	18.6	68.825	1281	1.280	52.2	1100.9	122.04	238	52.9
7H	0.78	660.0	22.6	55.247	1251	1.321	0.0	1638.5	170.79	405	50.6
8V	0.87	600.6	27.8	43.393	1207	1.118	59.4	334.0	23.16	67	8.4
9H	1.27	660.0	36.7	37.442	1372	1.449	0.0	1814.7	132.71	509	63.7
10V	1.38	588.5	44.9	27.471	1234	1.093	71.5	194.3	12.51	59	7.4
11H	1.97	590.0	63.9	17.428	1113	1.426	0.0	1572.5	79.76	533	66.7
12V	2.08	517.0	77.0	13.852	1067	1.056	73.0	90.8	4.38	35	4.4
13H	2.56	590.0	83.0	11.734	974	1.230	0.0	1048.5	33.69	293	37.6
14V	2.67	514.0	99.2	9.471	939	1.041	76.0	61.3	2.49	26	3.4
15H	2.88	590.0	93.3	9.841	918	1.080	0.0	475.4	8.76	86	11.7

TOTAL ROLLING POWER : 3280 kW

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

TERMINATED AT 10:24:52

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 3-1/2"x1/2"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 2.90 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)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	20.00	BOX	124.00 X	206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50 X	144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30 X	162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00 X	111.05	9678.9	26.7
5H	660.0	12.00	R.OVAL	67.60 X	132.57	6963.3	28.1
6V	660.0	12.00	ROUND	82.00 X	82.39	5292.1	24.0
7H	660.0	40.00	FLAT	40.00 X	106.11	4038.9	23.7
8V	660.0	18.50	EDGING	81.50 X	43.40	3366.9	16.6
9H	660.0	25.50	FLAT	25.50 X	97.26	2420.7	28.1
10V	660.0	18.50	EDGING	84.50 X	26.77	2192.8	9.4
11H	590.0	17.50	FLAT	17.50 X	94.88	1630.9	25.6
12V	590.0	10.00	EDGING	89.00 X	17.88	1545.8	5.2
13H	590.0	13.80	FLAT	13.80 X	94.02	1274.4	17.6
14V	590.0	10.00	EDGING	89.00 X	14.10	1209.6	5.1
15H	590.0	12.87	FLAT	12.87 X	90.06	1127.6	6.8

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

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 3-1/2"x1/2"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 2.90 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.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	TORQUE	POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.47	619.5	14.5	87.594	1269	1.390	40.5	1843.3	187.70	285	35.6
6V	0.62	607.8	19.4	68.825	1337	1.316	52.2	1158.2	131.33	267	59.4
7H	0.81	660.0	23.4	55.247	1295	1.310	0.0	1554.7	161.38	396	49.5
8V	0.97	600.9	30.9	43.393	1340	1.200	59.1	465.0	38.94	126	15.7
9H	1.35	660.0	39.1	37.442	1465	1.391	0.0	1488.9	108.94	446	55.8
10V	1.49	596.6	47.8	27.471	1312	1.104	63.4	211.3	13.54	68	8.5
11H	2.01	590.0	64.9	17.428	1132	1.345	0.0	1206.1	60.81	414	51.7
12V	2.12	513.5	78.7	13.852	1090	1.055	76.5	93.0	4.08	34	4.2
13H	2.57	590.0	83.1	11.734	975	1.213	0.0	884.3	30.05	262	33.5
14V	2.71	514.2	100.5	9.471	952	1.054	75.8	79.9	3.45	36	4.8
15H	2.90	590.0	93.9	9.841	924	1.073	0.0	381.6	7.39	73	9.8

TOTAL ROLLING POWER : 3166 kW

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

TERMINATED AT 10:24:52

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 4"x1/2"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 2.53 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	REDUCTION
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	20.00	BOX	124.00 X	206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50 X	144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30 X	162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00 X	111.05	9678.9	26.7
5H	660.0	13.00	R.OVAL	68.60 X	131.76	7070.5	26.9
6V	660.0	15.00	ROUND	85.00 X	82.27	5524.3	21.9
7H	660.0	40.00	FLAT	40.00 X	109.80	4183.1	24.3
8V	660.0	30.00	EDGING	93.00 X	41.83	3741.7	10.6
9H	660.0	25.50	FLAT	25.50 X	108.13	2699.7	27.8
10V	660.0	32.00	EDGING	98.00 X	26.30	2512.7	6.9
11H	590.0	17.50	FLAT	17.50 X	108.15	1863.5	25.8
12V	590.0	22.50	EDGING	101.50 X	17.86	1767.5	5.2
13H	590.0	13.80	FLAT	13.80 X	106.59	1447.8	18.1
14V	590.0	23.00	EDGING	102.00 X	14.02	1386.0	4.3
15H	590.0	12.87	FLAT	12.87 X	102.90	1292.9	6.7

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

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 4"x1/2"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 2.53 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.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	TORQUE	POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.46	619.3	14.3	87.594	1250	1.369	40.7	1781.9	179.95	269	33.6
6V	0.59	607.8	18.6	68.825	1281	1.280	52.2	1100.9	122.04	238	52.9
7H	0.78	660.0	22.6	55.247	1251	1.321	0.0	1638.5	170.79	405	50.6
8V	0.87	600.6	27.8	43.393	1207	1.118	59.4	334.0	23.16	67	8.4
9H	1.21	660.0	35.1	37.442	1313	1.386	0.0	1642.5	115.91	426	53.2
10V	1.30	596.4	41.7	27.471	1145	1.074	63.6	177.2	10.30	45	5.6
11H	1.76	590.0	56.8	17.428	991	1.348	0.0	1406.8	69.45	413	52.2
12V	1.85	513.5	68.9	13.852	954	1.054	76.5	99.1	4.62	33	4.4
13H	2.26	590.0	73.2	11.734	858	1.221	0.0	1059.2	35.97	276	40.1
14V	2.36	514.2	87.7	9.471	830	1.045	75.8	74.6	3.14	29	4.3
15H	2.53	590.0	81.9	9.841	806	1.072	0.0	447.2	8.42	72	11.2

TOTAL ROLLING POWER : 3033 kW

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

TERMINATED AT 10:24:52

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 76.2x15
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 2.90 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)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	20.00	BOX	124.00 X	206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50 X	144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30 X	162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00 X	111.05	9678.9	26.7
5H	660.0	12.00	R.OVAL	67.60 X	132.57	6963.3	28.1
6V	660.0	12.00	ROUND	82.00 X	82.39	5292.1	24.0
7H	660.0	40.00	FLAT	40.00 X	106.11	4038.9	23.7
8V	660.0	13.00	EDGING	76.00 X	44.50	3188.5	21.1
9H	660.0	25.50	FLAT	25.50 X	92.09	2287.7	28.3
10V	660.0	10.00	EDGING	76.00 X	27.38	2002.2	12.5
11H	590.0	19.50	FLAT	19.50 X	83.81	1601.5	20.0
12V	590.0	10.00	EDGING	77.00 X	20.12	1495.0	6.7
13H	590.0	16.20	FLAT	16.20 X	81.10	1283.1	14.2
14V	590.0	10.00	EDGING	76.00 X	16.67	1203.3	6.2
15H	590.0	15.20	FLAT	15.20 X	77.19	1129.5	6.1

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

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 76.2x15
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 2.90 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.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	TORQUE	POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.47	619.5	14.5	87.594	1269	1.390	40.5	1843.3	187.70	285	35.6
6V	0.62	607.8	19.4	68.825	1337	1.316	52.2	1158.2	131.33	267	59.4
7H	0.81	660.0	23.4	55.247	1295	1.310	0.0	1554.7	161.38	396	49.5
8V	1.03	601.3	32.6	43.393	1414	1.267	58.7	561.6	51.67	176	22.0
9H	1.43	660.0	41.4	37.442	1550	1.394	0.0	1417.1	105.83	459	57.3
10V	1.63	596.9	52.3	27.471	1437	1.143	63.1	253.8	17.99	99	12.3
11H	2.04	590.0	66.1	17.428	1153	1.250	0.0	869.6	40.74	282	35.3
12V	2.19	525.7	79.5	13.852	1101	1.071	64.3	120.2	5.70	47	5.9
13H	2.55	590.0	82.5	11.734	969	1.165	0.0	650.1	21.96	190	24.5
14V	2.72	527.8	98.4	9.471	932	1.066	62.2	101.7	4.52	47	6.2
15H	2.90	590.0	93.8	9.841	923	1.065	0.0	312.2	6.60	65	8.8

TOTAL ROLLING POWER : 3073 kW

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

TERMINATED AT 10:24:52

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 4"x9/16"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 2.25 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)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	20.00	BOX	124.00 X	206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50 X	144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30 X	162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00 X	111.05	9678.9	26.7
5H	660.0	13.00	R.OVAL	68.60 X	131.76	7070.5	26.9
6V	660.0	15.00	ROUND	85.00 X	82.27	5524.3	21.9
7H	660.0	40.00	FLAT	40.00 X	109.80	4183.1	24.3
8V	660.0	34.00	EDGING	97.00 X	41.19	3854.2	7.9
9H	660.0	25.50	FLAT	25.50 X	111.74	2793.1	27.5
10V	660.0	36.00	EDGING	102.00 X	26.22	2611.0	6.5
11H	590.0	18.50	FLAT	18.50 X	110.56	2015.5	22.8
12V	590.0	36.00	EDGING	103.00 X	18.92	1904.9	5.5
13H	590.0	15.50	FLAT	15.50 X	106.81	1628.8	14.5
14V	590.0	35.80	EDGING	101.80 X	15.77	1555.6	4.5
15H	590.0	14.47	FLAT	14.47 X	102.92	1452.3	6.6

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

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 4"x9/16"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 2.25 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.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	TORQUE	POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.46	619.3	14.3	87.594	1250	1.369	40.7	1781.9	179.95	269	33.6
6V	0.59	607.8	18.6	68.825	1281	1.280	52.2	1100.9	122.04	238	52.9
7H	0.78	660.0	22.6	55.247	1251	1.321	0.0	1638.5	170.79	405	50.6
8V	0.85	600.4	27.0	43.393	1172	1.085	59.6	267.7	16.08	45	5.7
9H	1.17	660.0	33.9	37.442	1269	1.380	0.0	1678.5	116.48	413	51.7
10V	1.25	596.4	40.1	27.471	1102	1.070	63.6	171.9	9.85	41	5.2
11H	1.62	590.0	52.6	17.428	916	1.295	0.0	1301.1	60.75	334	45.6
12V	1.72	525.3	62.5	13.852	865	1.058	64.7	114.4	5.67	37	5.4
13H	2.01	590.0	65.0	11.734	763	1.169	0.0	901.1	28.63	195	31.9
14V	2.10	527.2	76.2	9.471	722	1.047	62.8	90.3	3.97	32	5.5
15H	2.25	590.0	72.9	9.841	718	1.071	0.0	470.3	9.50	73	12.6

TOTAL ROLLING POWER : 2843 kW

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

TERMINATED AT 10:24:52

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 3-1/2"x5/8"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 2.34 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)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	20.00	BOX	124.00 X	206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50 X	144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30 X	162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00 X	111.05	9678.9	26.7
5H	660.0	12.00	R.OVAL	67.60 X	132.57	6963.3	28.1
6V	660.0	12.00	ROUND	82.00 X	82.39	5292.1	24.0
7H	660.0	40.00	FLAT	40.00 X	106.11	4038.9	23.7
8V	660.0	23.00	EDGING	86.00 X	42.54	3500.8	13.3
9H	660.0	26.50	FLAT	26.50 X	100.15	2594.5	25.9
10V	660.0	25.00	EDGING	91.00 X	27.33	2409.8	7.1
11H	590.0	20.00	FLAT	20.00 X	98.37	1933.2	19.8
12V	590.0	24.00	EDGING	91.00 X	20.56	1811.0	6.3
13H	590.0	17.20	FLAT	17.20 X	94.28	1586.0	12.4
14V	590.0	10.00	EDGING	89.20 X	17.58	1500.2	5.4
15H	590.0	16.08	FLAT	16.08 X	90.06	1399.9	6.7

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

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 3-1/2"x5/8"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 2.34 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.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	TORQUE	POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.47	619.5	14.5	87.594	1269	1.390	40.5	1843.3	187.70	285	35.6
6V	0.62	607.8	19.4	68.825	1337	1.316	52.2	1158.2	131.33	267	59.4
7H	0.81	660.0	23.4	55.247	1295	1.310	0.0	1554.7	161.38	396	49.5
8V	0.93	600.7	29.7	43.393	1289	1.154	59.3	390.2	29.64	92	11.5
9H	1.26	660.0	36.5	37.442	1366	1.349	0.0	1438.2	100.69	385	48.1
10V	1.36	596.8	43.5	27.471	1194	1.077	63.2	178.3	9.99	45	5.7
11H	1.69	590.0	54.8	17.428	955	1.247	0.0	1022.8	46.62	267	35.0
12V	1.81	525.9	65.6	13.852	909	1.067	64.1	128.5	6.39	44	6.0
13H	2.06	590.0	66.8	11.734	784	1.142	0.0	696.0	21.98	154	24.5
14V	2.18	514.7	80.9	9.471	767	1.057	75.3	105.2	4.65	39	6.4
15H	2.34	590.0	75.7	9.841	745	1.072	0.0	398.5	8.61	68	11.5

TOTAL ROLLING POWER : 2803 kW

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

TERMINATED AT 10:24:52

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 4"x5/8"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 2.04 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)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	20.00	BOX	124.00 X	206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50 X	144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30 X	162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00 X	111.05	9678.9	26.7
5H	660.0	13.00	R.OVAL	68.60 X	131.76	7070.5	26.9
6V	660.0	15.00	ROUND	85.00 X	82.27	5524.3	21.9
7H	660.0	40.00	FLAT	40.00 X	109.80	4183.1	24.3
8V	660.0	35.00	EDGING	98.00 X	41.04	3882.3	7.2
9H	660.0	26.50	FLAT	26.50 X	111.38	2894.1	25.5
10V	660.0	37.00	EDGING	103.00 X	27.14	2720.6	6.0
11H	590.0	20.00	FLAT	20.00 X	110.35	2172.8	20.1
12V	590.0	36.50	EDGING	103.50 X	20.42	2056.0	5.4
13H	590.0	17.20	FLAT	17.20 X	106.69	1799.6	12.5
14V	590.0	22.80	EDGING	102.00 X	17.49	1717.3	4.6
15H	590.0	16.08	FLAT	16.08 X	102.92	1606.7	6.4

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

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 4"x5/8"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 2.04 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.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	TORQUE	POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.46	619.3	14.3	87.594	1250	1.369	40.7	1781.9	179.95	269	33.6
6V	0.59	607.8	18.6	68.825	1281	1.280	52.2	1100.9	122.04	238	52.9
7H	0.78	660.0	22.6	55.247	1251	1.321	0.0	1638.5	170.79	405	50.6
8V	0.84	600.4	26.8	43.393	1163	1.077	59.6	249.9	14.36	40	5.0
9H	1.13	660.0	32.7	37.442	1225	1.341	0.0	1573.6	105.81	363	45.3
10V	1.20	596.7	38.5	27.471	1057	1.064	63.3	165.6	9.01	36	4.5
11H	1.51	590.0	48.7	17.428	850	1.252	0.0	1180.0	53.27	272	40.0
12V	1.59	525.8	57.8	13.852	801	1.057	64.2	120.6	5.86	35	5.5
13H	1.82	590.0	58.9	11.734	691	1.142	0.0	808.3	25.11	155	28.0
14V	1.91	514.6	70.7	9.471	670	1.048	75.4	99.2	4.29	32	5.9
15H	2.04	590.0	65.9	9.841	649	1.069	0.0	464.5	9.77	67	13.0

TOTAL ROLLING POWER : 2672 kW

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

TERMINATED AT 10:24:52

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 3-1/2"x3/4"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 1.96 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)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	20.00	BOX	124.00 X	206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50 X	144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30 X	162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00 X	111.05	9678.9	26.7
5H	660.0	12.00	R.OVAL	67.60 X	132.57	6963.3	28.1
6V	660.0	12.00	ROUND	82.00 X	82.39	5292.1	24.0
7H	660.0	40.00	FLAT	40.00 X	106.11	4038.9	23.7
8V	660.0	20.00	EDGING	83.00 X	43.11	3412.3	15.5
9H	660.0	26.50	FLAT	26.50 X	97.43	2521.8	26.1
10V	660.0	23.00	EDGING	89.00 X	27.28	2351.0	6.8
11H	590.0	20.40	FLAT	20.40 X	95.72	1917.6	18.4
12V	590.0	10.00	EDGING	89.20 X	21.04	1783.1	7.0
13H	590.0	19.30	FLAT	19.30 X	90.06	1670.3	6.3

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

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 3-1/2"x3/4"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 1.96 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.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	TORQUE	POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.47	619.5	14.5	87.594	1269	1.390	40.5	1843.3	187.70	285	35.6
6V	0.62	607.8	19.4	68.825	1337	1.316	52.2	1158.2	131.33	267	59.4
7H	0.81	660.0	23.4	55.247	1295	1.310	0.0	1554.7	161.38	396	49.5
8V	0.96	600.8	30.5	43.393	1323	1.184	59.2	438.9	35.67	114	14.2
9H	1.30	660.0	37.5	37.442	1406	1.353	0.0	1411.1	100.18	394	49.2
10V	1.39	596.8	44.5	27.471	1224	1.073	63.2	169.0	9.10	42	5.3
11H	1.71	590.0	55.2	17.428	963	1.226	0.0	936.8	41.50	240	31.2
12V	1.84	515.2	68.0	13.852	942	1.075	74.8	136.2	6.89	49	6.5
13H	1.96	590.0	63.4	11.734	744	1.067	0.0	370.1	8.68	58	9.7

TOTAL ROLLING POWER : 2605 kW

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

TERMINATED AT 10:24:52

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 4"x3/4"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 1.71 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)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	20.00	BOX	124.00 X	206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50 X	144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30 X	162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00 X	111.05	9678.9	26.7
5H	660.0	13.00	R.OVAL	68.60 X	131.76	7070.5	26.9
6V	660.0	20.00	ROUND	90.00 X	80.03	5829.8	17.5
7H	660.0	40.00	FLAT	40.00 X	115.27	4399.8	24.5
8V	660.0	32.00	EDGING	95.00 X	42.26	3860.6	12.3
9H	660.0	26.50	FLAT	26.50 X	109.31	2836.7	26.5
10V	660.0	35.00	EDGING	101.00 X	27.14	2666.5	6.0
11H	590.0	20.40	FLAT	20.40 X	107.75	2163.0	18.9
12V	590.0	22.90	EDGING	102.10 X	20.86	2039.3	5.7
13H	590.0	19.30	FLAT	19.30 X	102.92	1918.6	5.9

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

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 4"x3/4"
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 1.71 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.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	TORQUE	POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.46	619.3	14.3	87.594	1250	1.369	40.7	1781.9	179.95	269	33.6
6V	0.56	607.2	17.7	68.825	1215	1.213	52.8	958.2	102.08	189	41.9
7H	0.74	660.0	21.5	55.247	1189	1.325	0.0	1739.8	179.72	405	50.6
8V	0.85	600.6	26.9	43.393	1169	1.140	59.4	384.0	29.32	83	10.3
9H	1.15	660.0	33.4	37.442	1250	1.361	0.0	1611.1	112.16	392	49.0
10V	1.23	596.7	39.3	27.471	1079	1.064	63.3	164.8	8.88	37	4.6
11H	1.51	590.0	49.0	17.428	853	1.233	0.0	1094.5	48.17	247	36.2
12V	1.60	515.1	59.5	13.852	824	1.061	74.9	124.5	6.05	38	5.7
13H	1.71	590.0	55.2	11.734	648	1.063	0.0	418.8	9.37	54	10.5

TOTAL ROLLING POWER : 2473 kW

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

TERMINATED AT 10:24:52

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 100x20
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 1.66 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)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	20.00	BOX	124.00 X	206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50 X	144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30 X	162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00 X	111.05	9678.9	26.7
5H	660.0	13.00	R.OVAL	68.60 X	131.76	7070.5	26.9
6V	660.0	20.00	ROUND	90.00 X	80.03	5829.8	17.5
7H	660.0	40.00	FLAT	40.00 X	115.27	4399.8	24.5
8V	660.0	32.00	EDGING	95.00 X	42.26	3860.6	12.3
9H	660.0	26.50	FLAT	26.50 X	109.31	2836.7	26.5
10V	660.0	35.00	EDGING	101.00 X	27.14	2666.5	6.0
11H	590.0	21.20	FLAT	21.20 X	106.64	2223.4	16.6
12V	590.0	21.30	EDGING	100.50 X	21.76	2076.9	6.6
13H	590.0	20.26	FLAT	20.26 X	101.30	1971.6	5.1

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

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 100x20
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 1.66 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.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	TORQUE	POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.46	619.3	14.3	87.594	1250	1.369	40.7	1781.9	179.95	269	33.6
6V	0.56	607.2	17.7	68.825	1215	1.213	52.8	958.2	102.08	189	41.9
7H	0.74	660.0	21.5	55.247	1189	1.325	0.0	1739.8	179.72	405	50.6
8V	0.85	600.6	26.9	43.393	1169	1.140	59.4	384.0	29.32	83	10.3
9H	1.15	660.0	33.4	37.442	1250	1.361	0.0	1611.1	112.16	392	49.0
10V	1.23	596.7	39.3	27.471	1079	1.064	63.3	164.8	8.88	37	4.6
11H	1.47	590.0	47.6	17.428	830	1.199	0.0	974.5	40.57	202	30.5
12V	1.58	515.8	58.3	13.852	808	1.071	74.2	141.3	7.23	44	6.8
13H	1.66	590.0	53.7	11.734	630	1.053	0.0	367.9	8.02	45	8.9

TOTAL ROLLING POWER : 2426 kW

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

TERMINATED AT 10:24:52

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 90x30
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 1.26 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)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	20.00	BOX	124.00 X	206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50 X	144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30 X	162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00 X	111.05	9678.9	26.7
5H	660.0	12.00	R.OVAL	67.60 X	132.57	6963.3	28.1
6V	660.0	12.00	ROUND	82.00 X	82.39	5292.1	24.0
7H	660.0	40.00	FLAT	40.00 X	106.11	4038.9	23.7
8V	660.0	32.00	EDGING	95.00 X	41.00	3755.9	7.0
9H	660.0	35.00	FLAT	35.00 X	98.82	3367.2	10.4
10V	660.0	10.00	EDGING	93.00 X	35.81	3148.5	6.5
11H	590.0	31.40	FLAT	31.40 X	95.54	2878.6	8.6
12V	590.0	10.00	EDGING	90.60 X	32.13	2679.3	6.9
13H	590.0	30.39	FLAT	30.39 X	91.17	2587.3	3.4

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

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 90x30
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 1.26 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.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	TORQUE	POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.47	619.5	14.5	87.594	1269	1.390	40.5	1843.3	187.70	285	35.6
6V	0.62	607.8	19.4	68.825	1337	1.316	52.2	1158.2	131.33	267	59.4
7H	0.81	660.0	23.4	55.247	1295	1.310	0.0	1554.7	161.38	396	49.5
8V	0.87	600.4	27.7	43.393	1203	1.075	59.6	240.0	13.37	39	4.8
9H	0.97	660.0	28.1	37.442	1053	1.115	0.0	687.2	31.58	93	11.6
10V	1.04	582.1	34.1	27.471	937	1.069	77.9	210.4	10.79	39	5.1
11H	1.14	590.0	36.8	17.428	641	1.094	0.0	561.3	20.96	81	15.7
12V	1.22	516.6	45.1	13.852	625	1.074	73.4	195.1	9.27	44	8.8
13H	1.26	590.0	40.9	11.734	480	1.036	0.0	275.0	6.58	28	7.3

TOTAL ROLLING POWER : 2031 kW

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

TERMINATED AT 10:24:52

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 100x30
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 1.13 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)	(mm)	(mm²)	(%)
			SQUARE	182.30	X 182.30	33147.4	
1H	750.0	20.00	BOX	124.00	X 206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50	X 144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30	X 162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00	X 111.05	9678.9	26.7
5H	660.0	15.00	R.OVAL	70.60	X 130.17	7277.3	24.8
6V	660.0	22.00	ROUND	92.00	X 81.49	6043.5	17.0
7H	660.0	40.00	FLAT	40.00	X 118.13	4509.7	25.4
8V	660.0	42.00	EDGING	105.00	X 41.09	4174.3	7.4
9H	660.0	35.00	FLAT	35.00	X 108.99	3722.8	10.8
10V	660.0	19.00	EDGING	102.00	X 35.85	3473.6	6.7
11H	590.0	31.40	FLAT	31.40	X 104.64	3164.1	8.9
12V	590.0	20.20	EDGING	100.80	X 31.91	2992.4	5.4
13H	590.0	30.39	FLAT	30.39	X 101.30	2895.2	3.2

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

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 100x30
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 1.13 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.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	TORQUE	POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.45	619.1	13.9	87.594	1215	1.330	40.9	1663.7	165.13	240	30.0
6V	0.54	607.8	17.0	68.825	1171	1.204	52.2	952.3	99.13	177	39.2
7H	0.73	660.0	21.0	55.247	1160	1.340	0.0	1825.3	191.08	420	52.5
8V	0.78	600.4	24.9	43.393	1082	1.080	59.6	267.7	16.26	42	5.3
9H	0.88	660.0	25.4	37.442	952	1.121	0.0	790.8	36.61	98	12.8
10V	0.94	582.1	30.9	27.471	849	1.072	77.9	229.8	12.61	41	6.0
11H	1.03	590.0	33.5	17.428	583	1.098	0.0	642.8	24.12	85	18.1
12V	1.09	516.4	40.4	13.852	560	1.057	73.6	171.6	7.63	32	7.2
13H	1.13	590.0	36.6	11.734	429	1.034	0.0	299.7	6.80	26	7.6

TOTAL ROLLING POWER : 1920 kW

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

TERMINATED AT 10:24:52

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 90x32
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 1.19 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)	(mm)	(mm²)	(%)
			SQUARE	182.30 X	182.30	33147.4	
1H	750.0	20.00	BOX	124.00 X	206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50 X	144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30 X	162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00 X	111.05	9678.9	26.7
5H	660.0	12.00	R.OVAL	67.60 X	132.57	6963.3	28.1
6V	660.0	12.00	ROUND	82.00 X	82.39	5292.1	24.0
7H	660.0	40.00	FLAT	40.00 X	106.11	4038.9	23.7
8V	660.0	32.00	EDGING	95.00 X	41.00	3755.9	7.0
9H	660.0	35.00	FLAT	35.00 X	98.82	3367.2	10.4
10V	660.0	11.00	EDGING	94.00 X	35.67	3174.1	5.7
11H	590.0	33.40	FLAT	33.40 X	94.96	3027.2	4.6
12V	590.0	10.00	EDGING	90.60 X	34.10	2824.2	6.7
13H	590.0	32.42	FLAT	32.42 X	91.17	2743.6	2.9

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

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 90x32
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 1.19 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.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	TORQUE	POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.47	619.5	14.5	87.594	1269	1.390	40.5	1843.3	187.70	285	35.6
6V	0.62	607.8	19.4	68.825	1337	1.316	52.2	1158.2	131.33	267	59.4
7H	0.81	660.0	23.4	55.247	1295	1.310	0.0	1554.7	161.38	396	49.5
8V	0.87	600.4	27.7	43.393	1203	1.075	59.6	240.0	13.37	39	4.8
9H	0.97	660.0	28.1	37.442	1053	1.115	0.0	687.2	31.58	93	11.6
10V	1.03	582.0	33.8	27.471	929	1.061	78.0	190.6	9.19	33	4.4
11H	1.08	590.0	35.0	17.428	610	1.049	0.0	347.8	9.66	35	7.3
12V	1.16	517.2	42.8	13.852	593	1.072	72.8	197.4	9.09	41	8.6
13H	1.19	590.0	38.6	11.734	453	1.029	0.0	246.6	5.78	23	6.4

TOTAL ROLLING POWER : 1972 kW

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

TERMINATED AT 10:24:52

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 90x40
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 0.97 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)	(mm)	(mm²)	(%)
			SQUARE	182.30	X 182.30	33147.4	
1H	750.0	20.00	BOX	124.00	X 206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50	X 144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30	X 162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00	X 111.05	9678.9	26.7
5H	660.0	14.00	R.OVAL	69.60	X 130.96	7175.2	25.9
6V	660.0	18.00	ROUND	88.00	X 82.11	5754.5	19.8
7H	660.0	47.00	FLAT	47.00	X 106.99	4751.0	17.4
8V	660.0	10.00	EDGING	91.60	X 49.28	4158.0	12.5
9H	660.0	41.50	FLAT	41.50	X 95.54	3758.7	9.6
10V	660.0	10.00	EDGING	90.60	X 42.62	3442.4	8.4
11H	590.0	40.52	FLAT	40.52	X 91.17	3360.7	2.4

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

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 90x40
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 0.97 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.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	TORQUE	POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.46	619.2	14.1	87.594	1232	1.349	40.8	1722.1	172.44	254	31.7
6V	0.57	607.9	17.9	68.825	1229	1.247	52.1	1041.7	112.59	211	46.8
7H	0.69	660.0	19.9	55.247	1101	1.211	0.0	1335.5	130.11	272	33.9
8V	0.79	585.6	25.7	43.393	1114	1.143	74.4	420.1	29.53	79	9.9
9H	0.87	660.0	25.2	37.442	943	1.106	0.0	673.0	34.53	91	12.1
10V	0.95	589.2	30.8	27.471	846	1.092	70.8	275.8	14.86	48	7.1
11H	0.97	590.0	31.5	17.428	549	1.024	0.0	217.9	5.63	19	4.2

TOTAL ROLLING POWER : 1733 kW

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

TERMINATED AT 10:24:52

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 100x40
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 0.87 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)	(mm)	(mm²)	(%)
			SQUARE	182.30	X 182.30	33147.4	
1H	750.0	20.00	BOX	124.00	X 206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50	X 144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30	X 162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00	X 111.05	9678.9	26.7
5H	660.0	15.00	R.OVAL	70.60	X 130.17	7277.3	24.8
6V	660.0	25.00	ROUND	95.00	X 80.19	6214.4	14.6
7H	660.0	47.00	FLAT	47.00	X 114.44	5099.3	17.9
8V	660.0	21.00	EDGING	102.60	X 48.45	4642.2	9.0
9H	660.0	41.50	FLAT	41.50	X 106.26	4204.4	9.4
10V	660.0	20.20	EDGING	100.80	X 42.54	3873.1	7.9
11H	590.0	40.52	FLAT	40.52	X 101.30	3771.2	2.6

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

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 100x40
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 0.87 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.	SPEED	WORK DIA	ROLL RPM	GEAR RATIO	MOTOR RPM	R FACTOR	GROOVE FACTOR	R O L L I N G LOAD	TORQUE	POWER	UTIL
	(m/s)	(mm)	(RPM)		(RPM)		(mm)	(kN)	(kNm)	(kW)	(%)
	1.20										
1H	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.45	619.1	13.9	87.594	1215	1.330	40.9	1663.7	165.13	240	30.0
6V	0.53	607.5	16.6	68.825	1139	1.171	52.5	875.7	88.53	153	34.1
7H	0.64	660.0	18.6	55.247	1026	1.219	0.0	1453.5	140.10	272	34.1
8V	0.70	585.2	23.0	43.393	998	1.098	74.8	346.0	21.72	52	6.6
9H	0.78	660.0	22.5	37.442	843	1.104	0.0	738.4	36.41	86	12.7
10V	0.84	589.2	27.4	27.471	752	1.086	70.8	282.5	15.73	45	7.5
11H	0.87	590.0	28.1	17.428	489	1.027	0.0	255.4	6.57	19	4.9

TOTAL ROLLING POWER : 1628 kW

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

TERMINATED AT 10:24:52

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 100x48
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 0.74 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	20.00	BOX	124.00 X	206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50 X	144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30 X	162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00 X	111.05	9678.9	26.7
5H	660.0	58.00	FLAT	58.00 X	136.65	7524.9	22.3
6V	660.0	10.00	EDGING	99.60 X	63.62	5824.2	22.6
7H	660.0	49.60	FLAT	49.60 X	106.71	5041.8	13.4
8V	660.0	10.00	EDGING	100.80 X	51.10	4548.3	9.8
9H	660.0	48.62	FLAT	48.62 X	101.30	4443.0	2.3

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	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.43	660.0	12.6	87.594	1102	1.286	0.0	1787.0	210.42	277	34.7
6V	0.56	578.5	18.5	68.825	1277	1.292	81.5	777.9	79.51	154	34.3
7H	0.65	660.0	18.8	55.247	1038	1.155	0.0	983.2	66.97	132	16.5
8V	0.72	581.0	23.6	43.393	1026	1.109	79.0	356.3	21.56	53	6.7
9H	0.74	660.0	21.3	37.442	798	1.024	0.0	257.0	7.62	17	2.7

TOTAL ROLLING POWER : 1394 kW

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

TERMINATED AT 10:24:52

DANIELI-MORGARDSHAMMAR PASS DESIGN DEPT.
SPEED CALCULATION FOR HOT ROLLING MILL 07/04/23

JOB NO. : DPC68X01 LAYOUT NO. : 000-000-361-341

SECTION ROLLED : Flat 110x48
Hot rolling
MATERIAL : Spring Steel
ROLLING SPEED : 0.66 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	20.00	BOX	124.00 X	206.79	24635.6	25.7
2V	750.0	18.00	BOX	136.50 X	144.56	18539.6	24.7
3H	750.0	17.30	R.BOX	93.30 X	162.18	13204.3	28.8
4V	660.0	15.00	ROUND	111.00 X	111.05	9678.9	26.7
5H	660.0	58.00	FLAT	58.00 X	136.65	7524.9	22.3
6V	660.0	21.00	EDGING	110.60 X	61.52	6347.2	15.7
7H	660.0	49.60	FLAT	49.60 X	116.81	5545.6	12.6
8V	660.0	20.10	EDGING	110.90 X	50.92	5055.3	8.8
9H	660.0	48.62	FLAT	48.62 X	111.43	4935.5	2.4

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	0.13	650.9	3.9	118.730	463	1.346	99.1	2575.8	354.63	145	69.5
2V	0.18	639.8	5.3	85.673	451	1.329	110.2	2021.8	291.03	161	79.1
3H	0.25	685.9	6.9	118.730	819	1.404	64.1	2489.3	320.75	232	62.9
4V	0.34	587.8	11.0	74.409	817	1.364	72.2	1597.3	193.79	223	60.6
5H	0.43	660.0	12.6	87.594	1102	1.286	0.0	1787.0	210.42	277	34.7
6V	0.52	577.8	17.0	68.825	1173	1.186	82.2	587.7	51.64	92	20.5
7H	0.59	660.0	17.1	55.247	943	1.145	0.0	1021.9	65.20	117	15.4
8V	0.65	580.8	21.3	43.393	924	1.097	79.2	350.4	21.36	48	6.4
9H	0.66	660.0	19.2	37.442	718	1.024	0.0	290.4	8.46	17	3.0

TOTAL ROLLING POWER : 1311 kW

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

TERMINATED AT 10:24:52

3 Motor utilization diagrams